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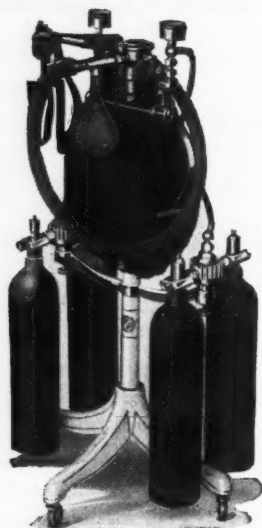
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The International Journal of Orthodontia, Oral Surgery and Radiography

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VOL. XV

ST. LOUIS, JUNE, 1929

No. 6

ORIGINAL ARTICLES

THE TECHNIC OF THE LINGUAL AND LABIAL ARCHES*

BY OREN A. OLIVER, D.D.S., F.A.C.D., NASHVILLE, TENN.

Former Professor of Orthodontia at Vanderbilt University

UPON the request of the Board of Censors I shall endeavor to give you the technic of the lingual and labial arches. However, before presenting the technic I feel that I should give you a brief history of the lingual arch together with some account of its pioneer users.

I find in Dr. Farrar's book, published in 1889, that there is a cut of a removable lingual arch with loops to straighten out for the purpose of moving teeth. In 1877 a man was born who was later responsible for the lingual and high labial arches. He was a graduate from Keokuk Dental College, which was later absorbed into Drake University and then into the University of Iowa. After engaging in general practice for one year in Keokuk, he took a course of instruction in the first class of the Angle School of Orthodontia, preparing himself to become professor of Orthodontia at the Keokuk Dental College, a position which he held for three years. He remained with Dr. Angle for one year, at the same time making regular trips to Keokuk to teach. In 1901 he opened an office in Chicago, still retaining his position at Keokuk. It was in 1905 when he gave his first clinic on the lingual arch at the Chicago meeting of the American Society of Orthodontists.

His first lingual arches were used for temporary retention during summer vacations and were attached by means of tubes slipped over the screw-post of molar clamp on the angle D bands. They were of the removable type; but while never limiting himself to either the fixed or the removable arches he found that these temporary retainers could be used as working retainers by using the wire stretching pliers. He began using the lingual arches in combination with the high labial arches at least as early as 1911, and in 1914 at the

*Read at the Twenty-seventh Meeting of the American Society of Orthodontists, April 30-May 3, 1928, Buffalo, N. Y.

Toronto meeting of the American Society of Orthodontists he recommended the combination of the two arches for retention.

The man of whom I am speaking is Dr. Lloyd S. Lourie of Chicago. It is to him that we owe a great debt for what he has given orthodontia. A full description of Dr. Lourie's use of the lingual arch in combination with the labial arch will be found in an article by Dr. Martin Dewey in the *INTERNATIONAL JOURNAL OF ORTHODONTIA*, volume ii, paragraphs 10-11. In an editorial in volume iii, No. 4, the *Journal* points out, it is true, that neither Dr. Lourie nor Dr. Mershon claims actually to have discovered the lingual arch which has been used for a long time, but it is the difference in their use of the appliances that makes it a new thing, and it is their scrupulousness and modesty in experimenting with and studying the choice for years before rushing into print that has made it somewhat difficult to obtain exact date as to when and how the work began.

Dr. Lourie, himself one of the pioneers in the development of the appliance, is quoted as believing that the credit for developing the lingual arch using the one-half-round tube attachments and finger springs should go to the man of whom I shall speak.

In 1889 another man who is responsible for the removable lingual arch was graduated from the Pennsylvania College of Dental Surgery and practiced general dentistry until 1908. During his nineteen years of general practice he was very much interested in the observation of the entire oral cavity and particularly that part pertaining to orthodontia. Seeking further knowledge in orthodontia he took a special course in 1908 in the Angle School. Immediately upon his graduation from this school he specialized in orthodontia.

After careful consideration he conceived the idea of the removable lingual arch which he used on the teeth of the mandible in a Division I, Class 2 case, his first case of this type for treatment, which came into his office within a month or two after he had gone into the exclusive practice of orthodontia. The arch was made of German silver wire, and he used horizontal tubes with the posterior ends closed, making these tubes himself out of German silver wire.

After the correction of the mesiodistal relation he realized that he would have to have some expansion in the canine and premolar regions. He started removing the lingual arch with the thought that he would have to have an outside expansion arch; but as he was removing the lingual arch, it occurred to him that if he could accomplish this with ligatures going from the labial arch around the teeth by pulling why could he not accomplish the same thing with something on the lingual side pushing? Therefore, he adjusted the lingual arch, making it a little broader in the canine and premolar regions, and replaced it.

He then realized the difficulty of removing and replacing the arch with the horizontal tubes. This led to his using the round vertical tubes on the lingual side of the molar bands.

Another problem confronted him when the anchor teeth rotated from the use of the round tubes, and many experiments were made to prevent this rotation. It was during this period that he developed the half-round tube and post which he is using today.

His next step in the lingual arch work was the making of the removable lingual arch to conform to all the inner qualities of the irregularities of the malposed teeth of the dental arch. He obtained his pressure on the teeth by removing the appliance, straightening out some of the curve, and replacing it. Realizing that this was quite complicated, it occurred to him that he might solder an extra piece to this arch to move the teeth. The soldering on of that piece was the beginning of his use of auxiliary springs in connection with the removable lingual arch.

This man who experimented with the possibilities of the removable lingual arch and made its success a reality was Dr. John V. Mershon of Philadelphia, and to him we owe the credit of being the founder of the half-round tubes and auxiliary springs in the removable lingual arch technic.

As far as can be learned, appreciation for the high labial and fixed lingual arch, which is used in conjunction with the lingual arch, should be given to Dr. Lloyd S. Lourie of Chicago.

In 1917 I was using, with moderate success, the labial and lingual arches with certain types of auxiliary springs, but upon studying Dr. Mershon's lingual arch technic at first hand I saw the possibilities of elaborating and experimenting a little further, and I have spent the last eleven years in efforts to complete more fully the technic as to details.

First, it is necessary that the instruments and materials used in the technic be shown. Fig. 1 shows the instruments used in the operating room, numbered for reference, with the name of the manufacturer given in each case. Fig. 2 shows the instruments used in the laboratory; Fig. 3, the materials used in my practice, with captions for the sizes of wires, band materials, tubes, and as in the other cases the name of the manufacturer.

SEPARATING THE TEETH PREPARATORY TO MAKING BANDS

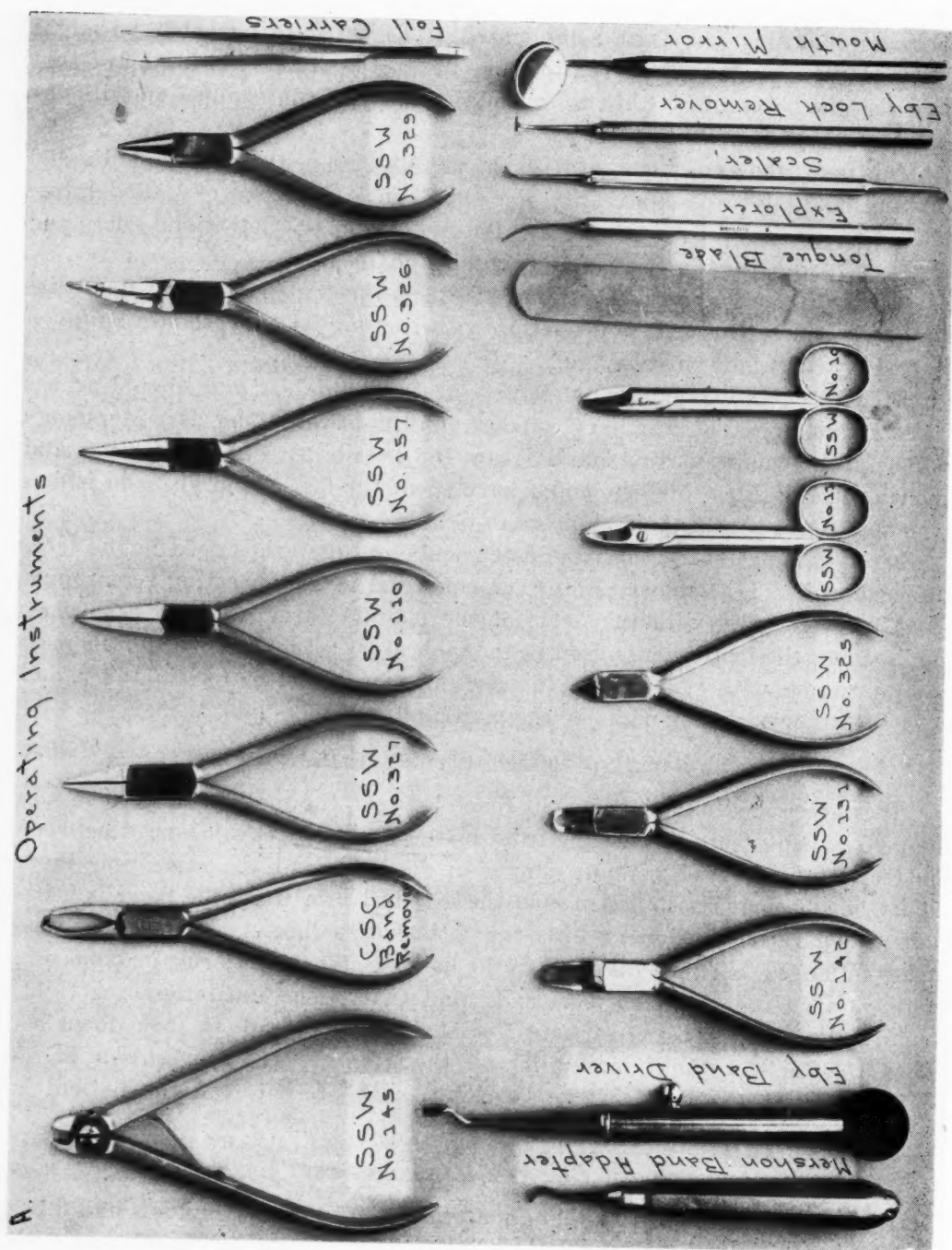
It is necessary to have sufficient space between the tooth to be banded and the proximating teeth so that the band material may be easily placed between the teeth and removed without danger of distortion; at the same time there should be sufficient resistance to hold the material firm while the band is being made. Separating is done by placing a .020 inch ligature wire, about two inches in length, between the tooth to be banded and the anterior proximating tooth. Carry the free ends occlusally and twist them until they are tight. Remove the surplus, using scissors No. 11, leaving enough to tuck down between the teeth without impinging on the gingiva. This operation is repeated if there is a posterior proximating tooth present, and the patient is dismissed for twenty-four hours (Fig. 4).

CONSTRUCTION OF THE MAXILLARY LEFT BAND

Step 1.—Take a length of band material, 0.007 inch in thickness and 0.187 inch in width, between the thumb and index finger of the left hand, and with the right hand, using pliers No. 110, grasp the extreme end of the band material at a right angle.

Step 2.—Bend $\frac{1}{16}$ inch of the material at a right angle.

Step 3.—Carry the pliers backward along the material to a distance of about $\frac{3}{8}$ inch, and bend it away from the first bend. Repeat this process twice,



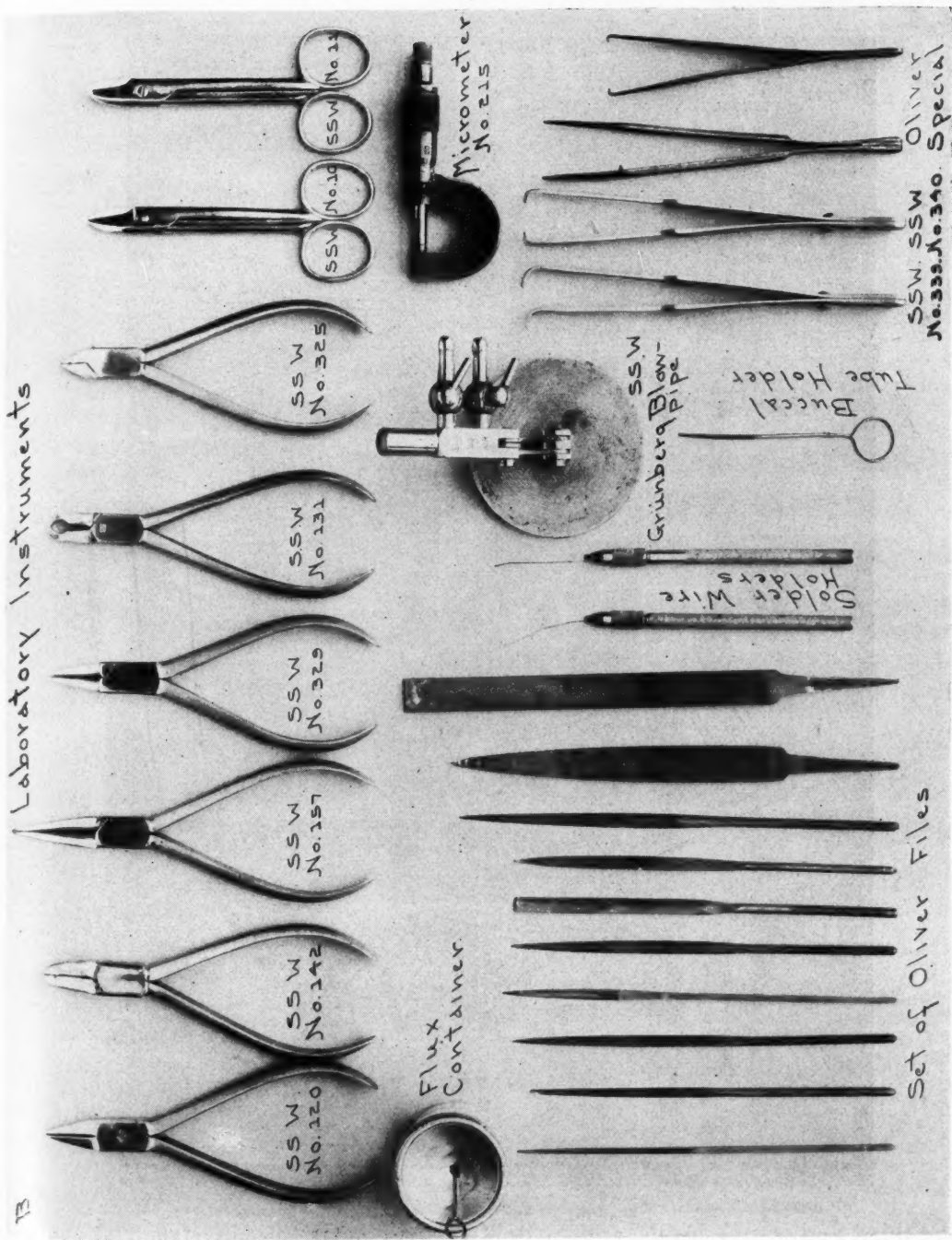


Fig. 2.—Laboratory instruments.

Step 5.—Take the long free end firmly between the thumb and the index finger, and grasping the material in the first bend with the pliers, press the



Fig. 4.—Separating the teeth by placing an .020 inch ligature wire between the approximating teeth.

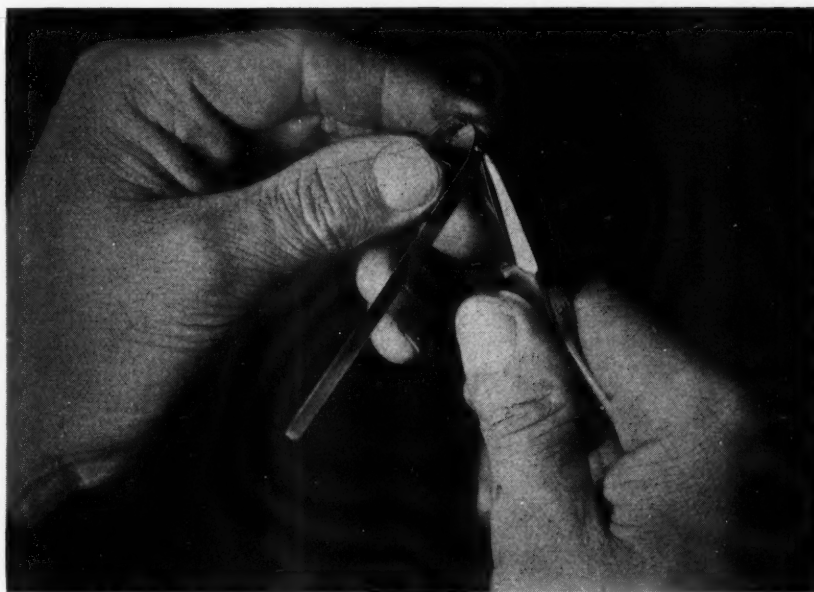


Fig. 5.—Taking length of Deortho band material 0.007 inch in thickness and $\frac{3}{16}$ inch in width, and roughly conforming it to the outlines of the tooth with S.S.W. pliers No. 100.

band material posteriorly. This operation will bring the band material in contact around the lingual and posterior surfaces of the tooth (Fig. 6).

Step 6.—With a Mershon band adapter against the center of the occlusal

margin of the lingual surface, press the band up to the gingival margin. Repeat this operation on the posterior and anterior occlusal margins.



Fig. 6.—Carrying the band material between the approximating teeth with S.S.W. pliers' No. 110, placing the posterior part first.

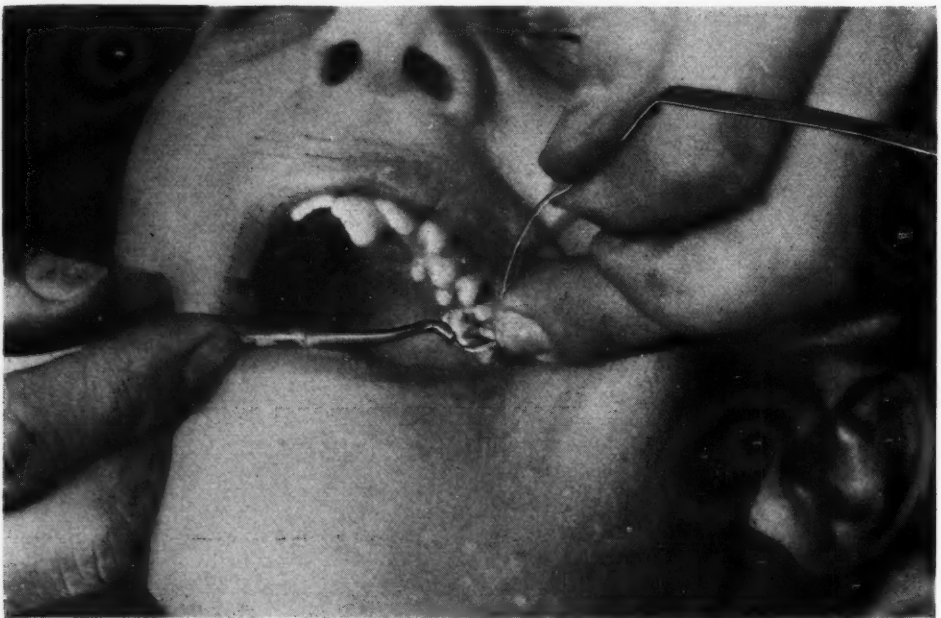


Fig. 7.—Adapting the center of the occlusal margin of the lingual surface with a Mershon band adapter.

The position of the operator is in front and to the left of the patient (Fig. 7).

Step 7.—Place the ball of the thumb of the left hand over the occlusal surface of the banded tooth to hold the band firmly in position, at the same time using the index finger of the same hand to keep the cheek away. With



Fig. 8.—Pinching the two parts of the band material tightly together at the anterior buccal angle with S.S.W. pliers No. 326.



Fig. 9.—Cutting end of band with S.S.W. scissors No. 10 to the degree of bevel established by the surfaces when pinched together.

band-forming pliers No. 326 in the right hand, place the anterior beak against the short $\frac{1}{16}$ inch bend and the posterior beak behind and against the long part of the band at the posterior buccal angle. Keeping the anterior beak station-

ary and firmly pressed against the band and tooth, slowly close the pliers, drawing the posterior beak forward, and pinching the two parts of the band material tightly together at the anterior buccal angle (Fig. 8).



Fig. 10.—Marking the band with a sharply pointed instrument at the remaining anterior right angle, allowing one millimeter for lap joint.



Fig. 11.—Straightening out the anterior right angle bend with S.S.W. pliers No. 142.

Step 8.—Remove the band carefully from the tooth to avoid distortion, and with straight seissors No. 10 cut the surplus part of the band material exactly at the posterior right angle bend (Fig. 9).

Step 9.—With a sharp instrument make a mark exactly at the remaining anterior right angle bend (Fig. 10).

Step 10.—With pliers No. 142 straighten out the right angle bend and cut $\frac{1}{32}$ inch from the end, leaving about $\frac{1}{32}$ inch for overlapping. Bring the

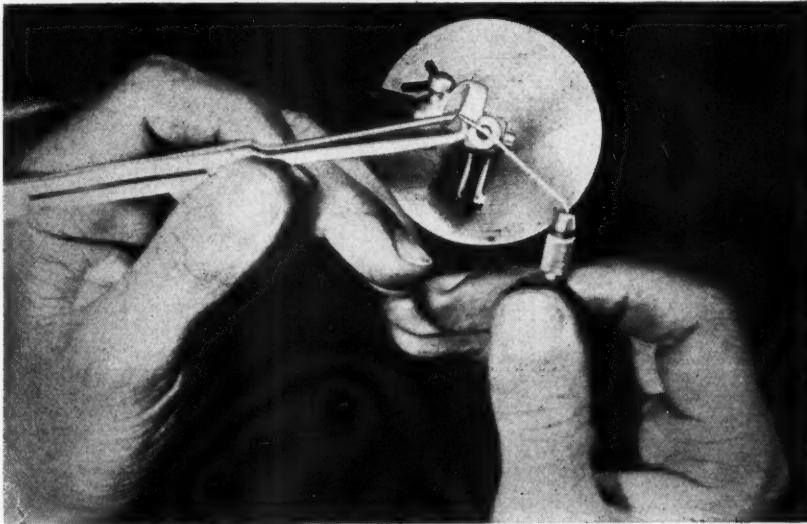


Fig. 12.—Clamping the laps between S.S.W. soldering pliers No. 340, placing flux on joint and uniting with Dee's 18K. solder.



Fig. 13.—Festooning slightly the anterior and posterior gingival margins of the band with S.S.W. scissors No. 11.

posterior end of the band over the marked position, press the two ends together and pinch (Fig. 11).

Step 11.—The posterior part of the band material is now lapped over the anterior part just up to the mark on the latter. Clamping the laps between soldering pliers No. 340, place flux on the joint, and unite them with 18 K. solder (Fig. 12).

Step 12.—With curved seissors No. 11, festoon slightly the anterior and posterior gingival margins of the bands, being careful to festoon the band to conform to the gingiva on the anterior and posterior margins (Fig. 13).

The festooning of the mandibular band is different from that of the maxillary in that a part of the gingival margin is removed on three sides by one continuous cut, commencing at the anterior buccal angle and following round the lingual surface to the posterior buccal angle. Make a similar cut on the occlusal margin, this time commencing at the anterior occlusal angle and continuing round the buccal surface to the posterior buccal angle. The reason for festooning in this manner is that, normally, the mandibular molar has a lingual inclination and a prominent convex buccal surface. A band fitted to the tooth by this method will not impinge on the gingival margin lingually, while on the buccal surface the occlusal margin will not be in contact with the overlapping cusp of the maxillary molar.



Fig. 14.—Contouring on the buccal and lingual surfaces with S.S.W. pliers No. 145.

CONTOURING THE BAND

Step 13.—Hold the band between the thumb and index finger of the left hand, and with pliers No. 145 contour on the buccal and lingual surfaces only. With the curved beak on the inner surface of the band, pinch rapidly along the center from the posterior to the anterior angles. Repeat this movement toward the occlusal and gingival third, being always careful not to contour the band on the anterior and posterior surfaces (Fig. 14).

Step 14.—Now place the band on the tooth. First press the band over the tooth as far as possible with the finger. Then, since it is impossible to seat the band perfectly with the finger, place a flat wooden tongue depressor on the occlusal margin of the band, and instruct the patient to close slowly against the depressor. The pressure will force the band partly over the tooth, and care should be taken to see that the band is being forced evenly without distortion.

Then instruct the patient to close tightly, forcing the band almost to the proper position. The reason for enlisting the patient's aid is that there is necessarily a certain amount of pain, or at least discomfort, experienced when the band is



Fig. 15.—Placing band on tooth by pushing up with tongue depressor.

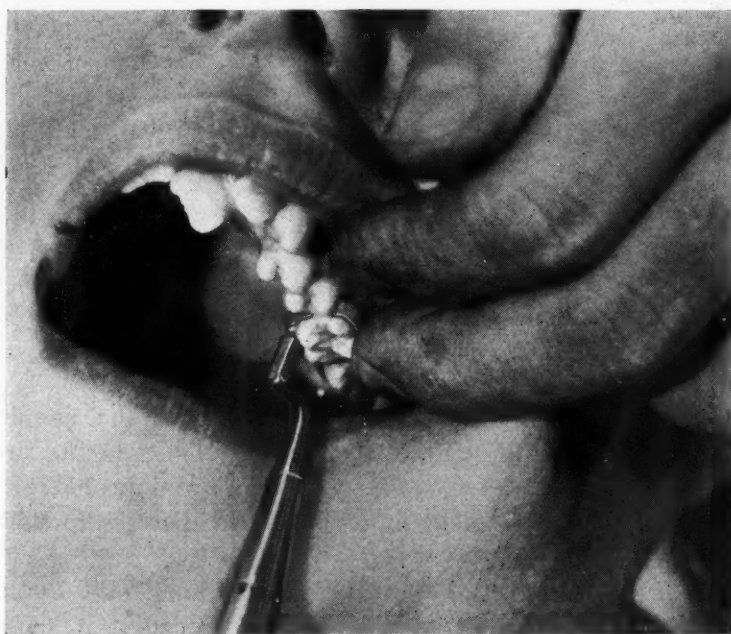


Fig. 16.—Seating the band with the Eby band driver.

forced on a tooth, and it has been found that the patient will suffer this more readily when it is self-inflicted (Fig. 15).

Step 15.—The band is now finally seated by pushing alternately against the posterior and anterior margins with the Mershon band adapter and completing the seating with the Eby band driver (Fig. 16).

Step 16.—Remove the band with great care to avoid distortion, using Case band removers; the right angle beak is on the occlusal surface of the tooth, and the straight beak between the gingiva and margin of the band; press down alternately on the buccal and lingual surfaces.

Step 17.—With pliers No. 142, turn about $\frac{1}{32}$ inch of the occlusal margin slightly in toward the center of the band. Repeat this movement on the gingival margin (Fig. 17).

Smooth all rough margins with a fine file or small stone. I use a stone on a dental engine.

Now replace the band on the tooth with the fingers only, and seat it with a Mershon band adapter and Eby band driver.

Now carefully examine the band to see that it fits properly. It should be impossible to move or rock the band by pushing on any of its margins with a



Fig. 17.—Crimping the gingival and occlusal margins slightly with S.S.W. pliers No. 142.

band adapter. If there is any movement present, a new band should be made, as in my experience a rocking band always becomes loose during the course of treatment. The result will be unstable anchorage and probable loss of the tooth from caries, with subsequent annoyance and distress to both operator and patient.

The advantage of using a lap band is that the band may be made larger if necessary; also, attachments may be soldered immediately over the joint without risk of unsoldering the band.

CONSTRUCTION OF THE MAXILLARY RIGHT BAND

The procedure is the same as described for the maxillary left band, with the following exceptions:

The position of the operator is at the right side and slightly in front of the patient. The second finger of the left hand holds the band in position while it is being pinched.

CONSTRUCTION OF THE MANDIBULAR LEFT BAND

The position of the operator is in front and to the right of the patient.

Grasp the band material with pliers No. 110 halfway between the teeth and the cheek. Place that part of the band held by the pliers between the posterior surface of the tooth to be banded and the proximating tooth. Now transfer the pliers between the first and second bends, carrying the anterior portion into position, bringing the short $\frac{1}{16}$ inch bend to the anterior buccal angle. Let the index finger of the left hand lie between the tongue and the lingual surface of the teeth, holding the tongue away from the field of operation and at the same time resting against the lingual surface of the band material. The band material is finally seated in the anterior and posterior surfaces with the Mershon band adapter.

Let the index finger of the left hand rest on the occlusal surface to hold the band material in position. Grasp the band material at the first bend with pliers No. 326, and pushing posteriorly bring the band material in contact at the posterior, anterior and lingual surfaces of the tooth. With band-forming pliers No. 326 in the right hand, place the anterior beak at the short $\frac{1}{16}$ inch bend and the posterior beak behind and against the long part of the band material at the posterior buccal angle. Keeping the anterior beak stationary and firmly pressed against the band and the tooth, slowly close the pliers, drawing the posterior beak forward and pinching the two parts together at the anterior buccal angle.

Remove the band from the tooth and solder it just as the maxillary band.

CONSTRUCTION OF THE MANDIBULAR RIGHT BAND

The procedure is the same as described for the mandibular left band with the following exceptions:

The position of the operator is behind and to the left of the patient. Place the thumb and index finger of the left hand in the mouth, the index finger holding the cheek away and the thumb between the tongue and the lingual surface of the tooth. After the band material is placed around the tooth, hold the band in position with the thumb. The operator's position is now changed to the right of the patient. The band is pinched around the tooth with pliers No. 326 as described for the mandibular left band.

ATTACHMENT OF THE HALF-ROUND TUBE

As the position of the tube on the maxillary band is different from that on the mandibular, separate technics will be described for each.

Maxillary Tube.—With tweezers No. 339 grasp the band on the buccal surface around the soldered joint. Place a small quantity of 18 K. solder on the band at the center of the lingual side. Grasp the tube with Oliver special tweezers and hold it against the solder on the band at an angle of 5 degrees, and within 0.022 inch of the gingival margin; the occlusal margin of the tube is slightly nearer the anterior surface of the band. Hold the band and the tube over flame and unite them. The tube is placed close to the gingival margin to avoid interference from the occluding cusp of the opposing mandibular tooth, and at an angle to compensate for the posterior inclination of the molar (Fig. 18).

Mandibular Tube.—The mandibular tube is placed parallel to and level with the occlusal margin of the band when the teeth are in normal relationship; but, where the maxillary teeth are in lingual occlusion, the tube must be placed nearer the gingival margin to avoid interference from the occluding cusps of the opposing maxillary teeth.



Fig. 18.—Soldering on the band the Deeortho half-round tube while holding the band with S.S.W. pliers No. 339 and tube with Oliver special pliers.



19-A



19-B

Fig. 19.—The finished maxillary and mandibular bands.

Now replace the bands on the teeth preparatory to taking impressions in the modeling compound.

Fig. 19 shows maxillary and mandibular band complete.

IMPRESSION

The author uses a Monson Compound Heater, so that the compound may be kept at an even temperature, and mixes one cake each of Kerr's and S. S. White's black compound thoroughly together. This mixture gives a very flexible compound. Select a suitable Mershon tray (specially designed to prevent

lip interference). Place the compound in a tray, rolling it out over the edges, leaving that part in the vault of the tray concave.

Place it in the mouth by first carrying the anterior part to position; and sliding the fingers posteriorly, press the posterior part into position.

Hold the compound in position until it is hard; then remove it very carefully to avoid distortion in the region of the bands, and chill it under cold running water.

Remove the bands as has been previously described, and place them back in the impression exactly corresponding with the outline showing in the compound. Be particular to see that the bands are properly seated in the impression.

Using sticky wax, unite the bands to the compound on the buccal and lingual surfaces.

Boxing the Impression.—Fill out the irregularities at the back of the impression with plastine. Fill in the tongue space of the mandibular model.

Wrap a strip of Ashe's soft metal No. 3, 10 inches by 2 inches, around the impression, and hold it with a rubber band. Crimp the metal to fit snugly underneath, and secure it with a small roll of plastine.

Mixing Stone.—The model may be made of any heat-resisting stone, and is mixed according to the detailed instructions accompanying the stone. I use Clover Leaf Vulcanizing Stone. Thorough spatulation insures fewer air bubbles and more rapid setting.

Running.—Begin by introducing a small amount of the mixture into the extreme left posterior of the impression; jar it down thoroughly. Add a small amount at the same point, and jar it down thoroughly. Continue this operation until the mixture is firmly packed into all the teeth; then add the mixture more rapidly until the model is the desired height. Keep the impression level.

To Separate.—When the stone is hard, remove the plastine and soft metal, both of which may be used again. Remove the tray and trim the model to the desired shape. Place it in hot water to soften the compound, being careful not to have the water too hot or to leave the model in too long. Begin at the posterior left to pinch the compound gently up and off the teeth. Proceed in this manner all around until the compound is free of the teeth. Then lift off the compound. Next, remove the compound from the buccal side, then the lingual.

CONSTRUCTION OF THE LINGUAL ARCH

Step 1.—First outline the gingival margin by trimming it lightly with a Prothero spatula. Take care to see that the half-round tubes are free from obstructions. Now place the model with the occlusal surface of the teeth toward the operator. With a flat file, flatten the end of a length of half-round wire (Fig. 20).

Step 2.—Place a small quantity of flux on the end of the half-round wire (Fig. 21).

Step 3.—Hold the wire in the flame until sufficient heat is obtained to flow solder on the end. This operation is performed by touching 18 K. wire solder at the right moment, care being taken to avoid overflow on the sides (Fig. 22).

Step 4.—Next touch the soldered end with flux, and hold the wire with its flat surface toward the operator. Place the soldered end of the half-round wire at a right angle against, and about $\frac{1}{4}$ inch from the end of, a length of 0.038 inch wire. Hold the two in a flame and unite them (Fig. 23).

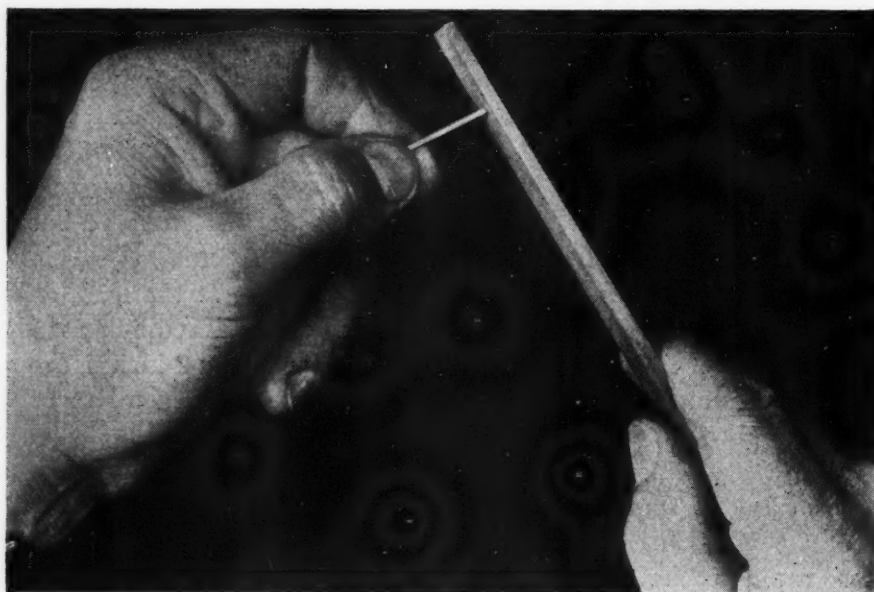


Fig. 20.—Flattening the end of the Deeortho half-round wire with file.



Fig. 21.—Placing the flux on the end of half-round wire.

Step 5.—With pliers No. 131, cut the half-round wire, leaving a little more than the length of a half-round tube attached to the round wire (Fig. 24).

Step 6.—File the clipped end smooth so that it may easily be placed in the half-round tube (Fig. 25).

Step 7.—Carefully place the half-round wire in the half-round tube with the fingers. Take care to see that the half-round wire is started in straight. Seat the half-round wire in its proper place with a flat file (Fig. 26).

Step 8.—After the half-round wire has been seated in the half-round tube, carry the file along the body wire just anteriorly to the band, and press it

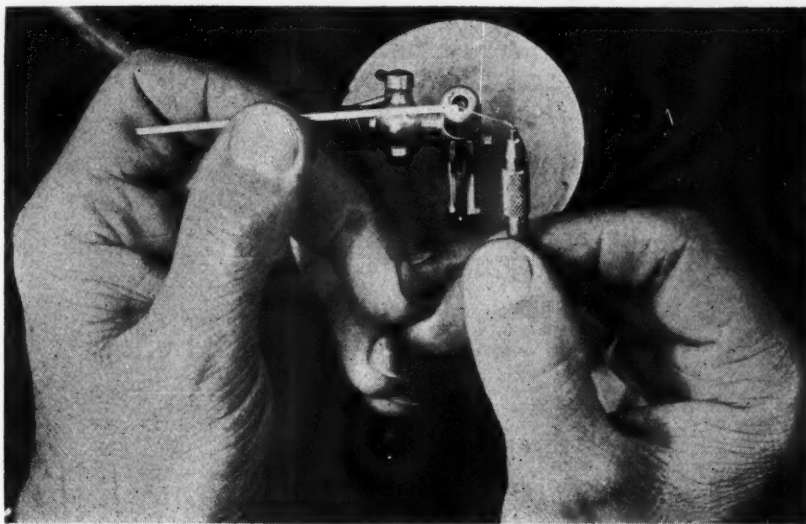


Fig. 22.—Putting a small bit of 18K. solder on the end of the half-round wire.

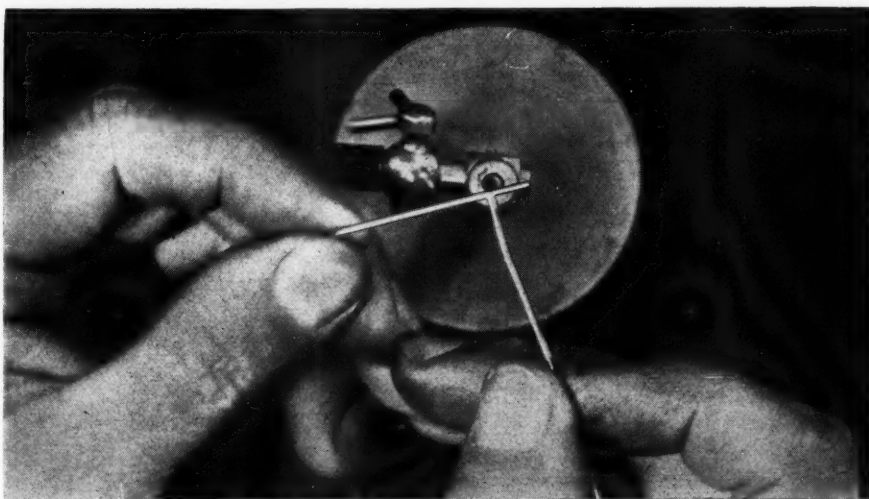


Fig. 23.—Soldering the half-round wire to 0.038 Deepep lingual base wire.

firmly down toward the gingival margin and against the lingual surface of the teeth. Hold the long free end of the body wire clear of the anterior teeth by resting it in the second, third, and fourth fingers of the right hand alongside the file. The band and the posterior part of the body wire are firmly supported by the fingers and thumb of the left hand (Fig. 27).

Step 9.—Hold the body wire against the teeth on the left side by placing the thumb of the left hand in the canine region, and with the free end of the

wire in the right hand, bend it carefully around to the region of the right canine (Fig. 28).

Step 10.—The thumb of the left hand follows around to the position illustrated, resting on the opposite side at the canine region, and holding the



Fig. 24.—Cutting off the half-round wire with S.S.W. pliers No. 131.



Fig. 25.—Smoothing the end of half-round wire with file.

wire firmly in place while it is bent with the right hand until it lies immediately over the half-round tube on the right side (Fig. 29).

Step 11.—With the left hand still firmly holding the wire in position, take a sharp-edged file in the right hand and mark the wire directly over the center of the half-round tube (Fig. 30).

Step 12.—Next, remove the wire from the half-round tube on the left side by taking a file in the left hand and pressing downward on the tooth and the

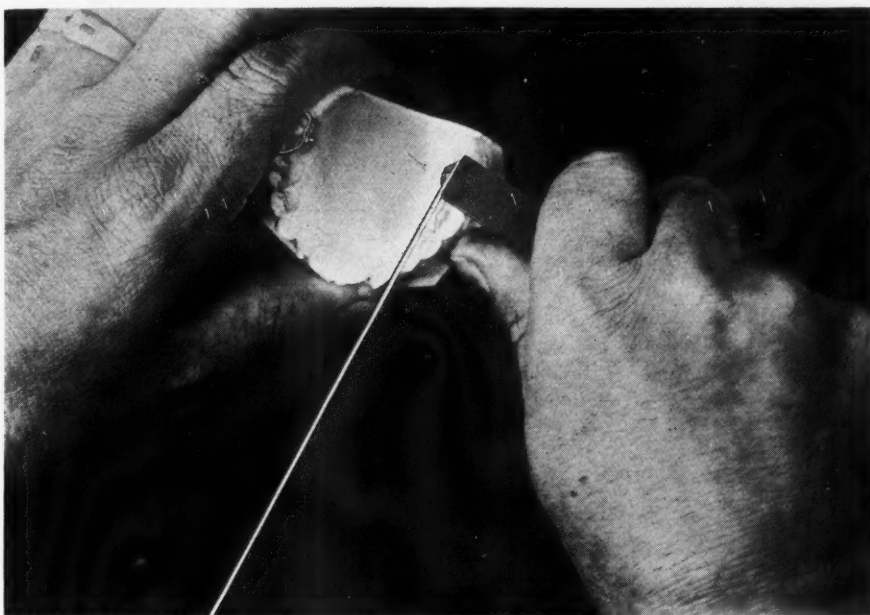


Fig. 26.—Placing the half-round wire into the half-round tube and pushing into a correct position with flat file.

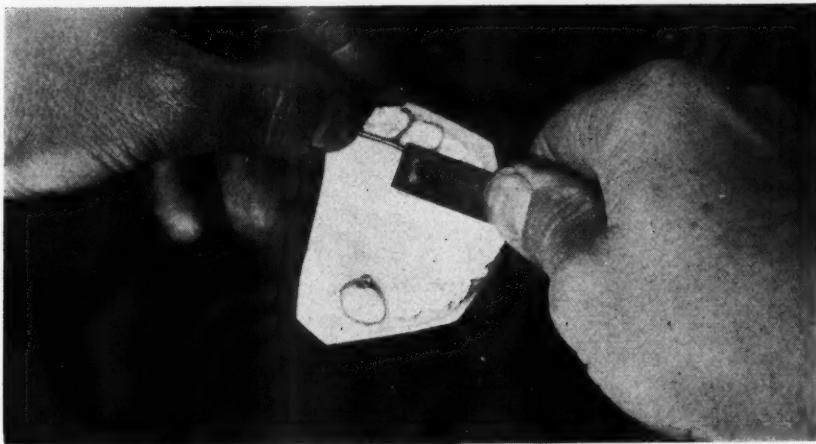


Fig. 27.—Bending the .038 inch lingual arch wire down cervically in front of the molar with square end of the file, the edges of which have been rounded.

edge of the band, grasping the wire anterior to the half-round tube with pliers No. 326 and raising it up carefully. The wire has to be removed carefully. to avoid breaking the tooth off the model (Fig. 31).

Step 13.—After removing the body wire, extend the file mark on to the opposite side so that the exact position in which to place the half-round wire may be seen (Fig. 32).

Step 14.—Take a length of half-round wire, flatten the end, flux and add solder as before, and unite it to the body wire exactly at the file mark previ-

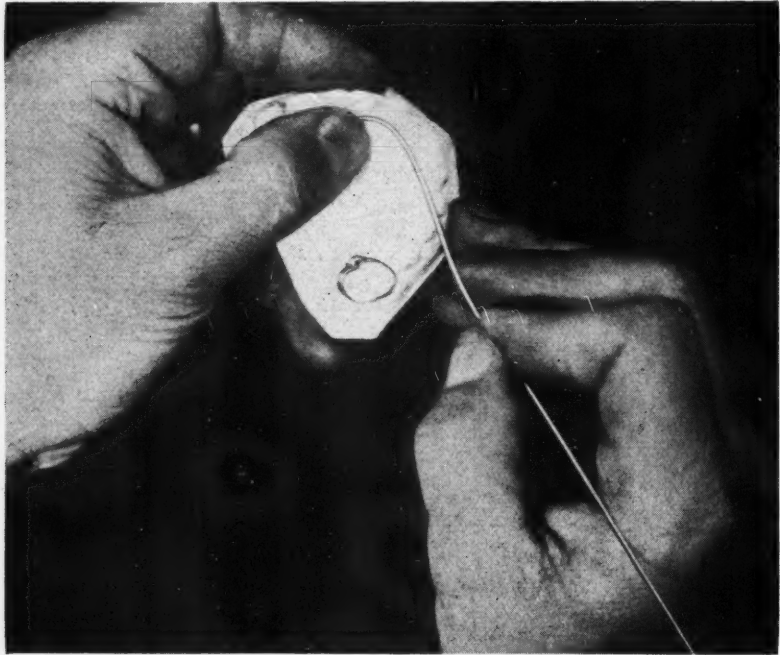


Fig. 28.—Bending the lingual arch around the thumb at the left canine.

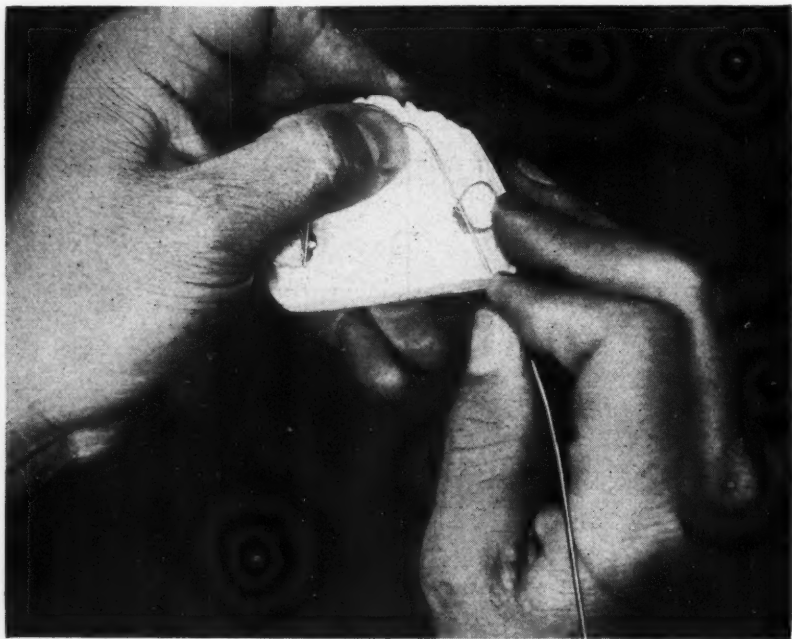


Fig. 29.—Holding and bending the wire around the thumb at the right canine angle, bringing the unfinished end of the wire back over the half-round tube.

ously made, paying no attention to the angle at which the wire is united. During the operation keep the flat side of the half-round wire turned toward the operator (Fig. 33).

Step 15.—Clip the half-round wire with pliers No. 131 at the proper length for the tube (Fig. 34).

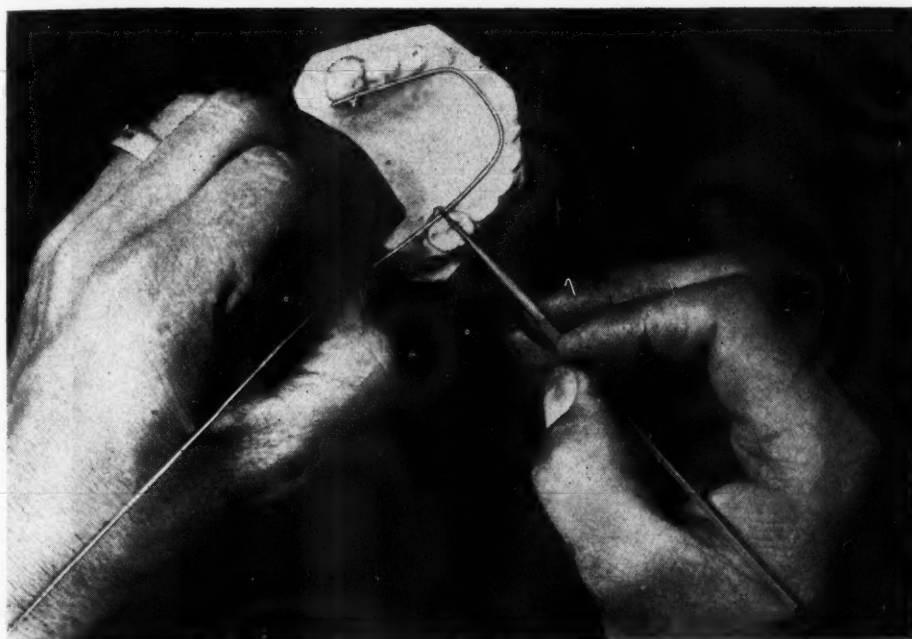


Fig. 30.—Marking with file on the base wire over the center of the half-round tube.



Fig. 31.—Removing the half-round wire by pressing down with file over the band and raising the wire with the S.S.W. pliers No. 325.

Step 16.—Remove the surplus round wire. An extra $\frac{1}{4}$ inch is allowed in case the body wire has to be made slightly larger (Fig. 35).

Step 17.—Next, smooth the end of the half-round wire with a file and place the half-round wire in the tube on the model, this time fitting the wire in the right tube first, and then fitting it on the left. The reason for fitting the wire on the right side first is that the left side has already been fitted and will go in more easily (Fig. 36).



Fig. 32.—Making continuation of the mark on round wire over half-round tube, so that the mark is visible for soldering the half-round wire.

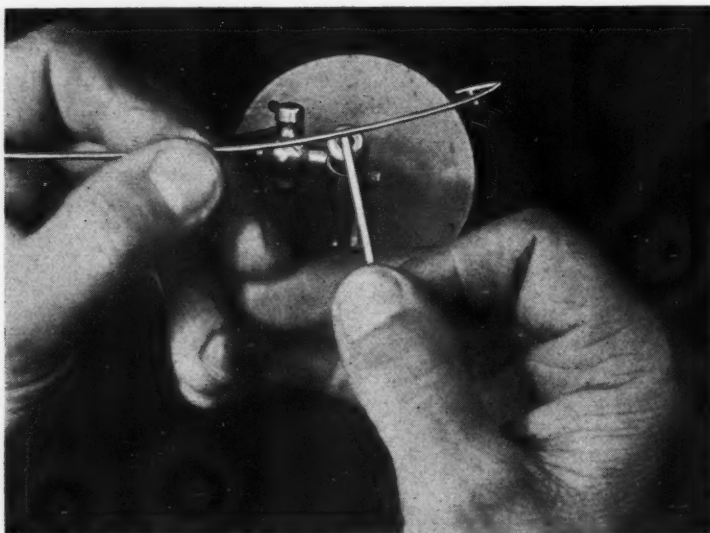


Fig. 33.—Soldering the half-round wire to the 0.038 inch wire on the opposite side of the body wire.

Step 18.—Using the flat end of a large file, press the body wire down on the right side toward the gingival margin and against the lingual surface of the teeth, as has been previously described for the left side. This operation completes the correct seating of the body wire on the right side (Fig. 37).

Step 19.—Place the tweezers with grooved ends on the anterior portion of the body wire. Press downward and posteriorly, and, holding the arch in this position, apply the flame of a blowpipe opposite the left canine. Carry the



Fig. 34.—Cutting the half-round wire with S.S.W. pliers No. 131.

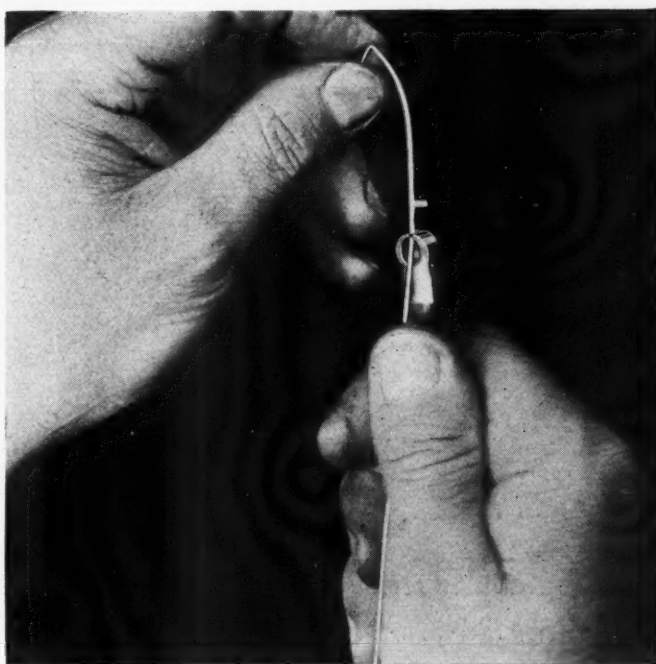


Fig. 35.—Cutting the 0.038 inch wire with S.S.W. pliers No. 131 about one-quarter inch posterior to the half-round tube.

flame over to the right canine. Spread the tweezers along the body wire toward the canines, and apply the flame between the canine and molar on each side, then to the anterior portion between the canines. This operation completes the correct seating of the body wire (Fig. 38).

Step 20.—Clip the wire posterior to the tube on the right side, leaving $\frac{1}{4}$ inch as on the opposite side. With the flat end of a large file press the ends posterior to the tubes against the bands to avoid interference with the tongue (Fig. 39).



Fig. 36.—Placing the half-round wire in the half-round tube on the opposite side of the model.

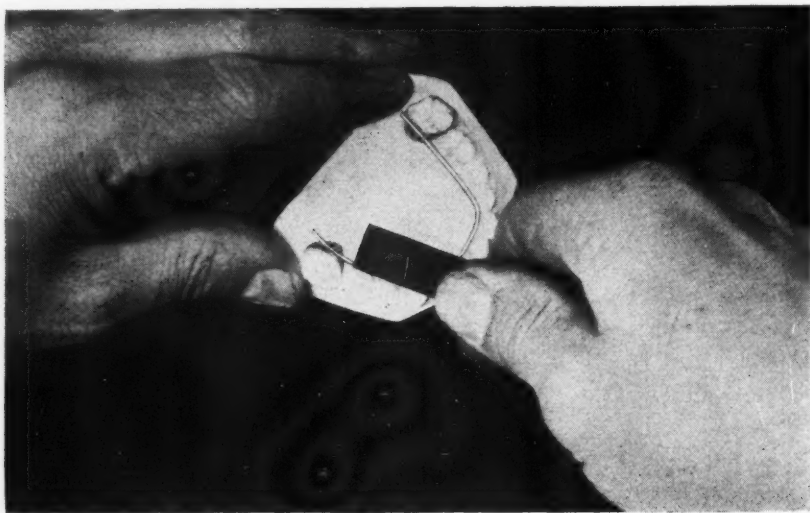


Fig. 37.—Pushing the wire down cervically in front of the molar with the square end of a file.

Step 21.—For the next step take a sharp-edged file, and mark the position on the lingual arch where stabilizers are to be placed. The position of these is determined by the type of spring that is used (Fig. 40).

Step 22.—Place the flux on the body wire and apply flame. Place a small quantity of 14 K. solder on the buccal surface of the wire between the canine and the premolar on each side (Fig. 41).

Step 23.—Take a length of 0.02 inch wire; solder and join it at right angles with the lingual body wire (Fig. 42).

Step 24.—Clip the 0.02 inch wire with pliers No. 131, leaving a spur just long enough to lie between the canine and the premolar (Fig. 43).

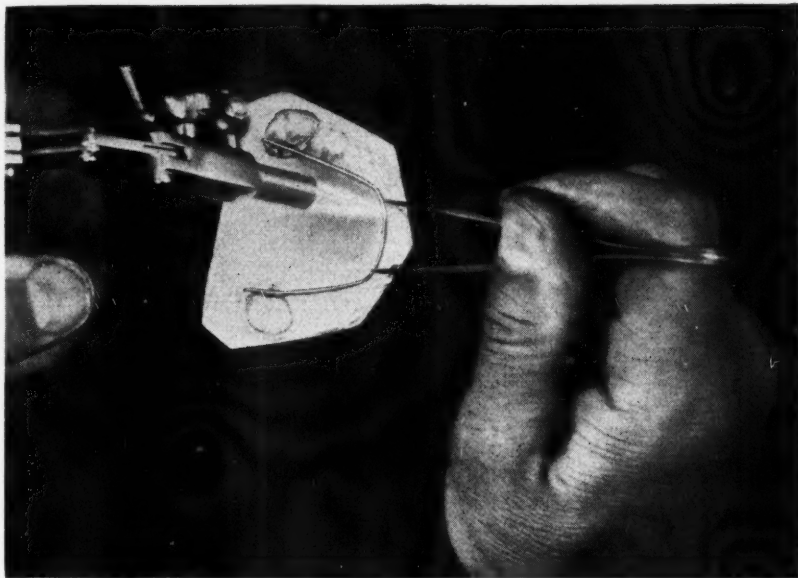


Fig. 38.—Holding the lingual arch wire down with Oliver special pliers and rendering the arch passive with heat.

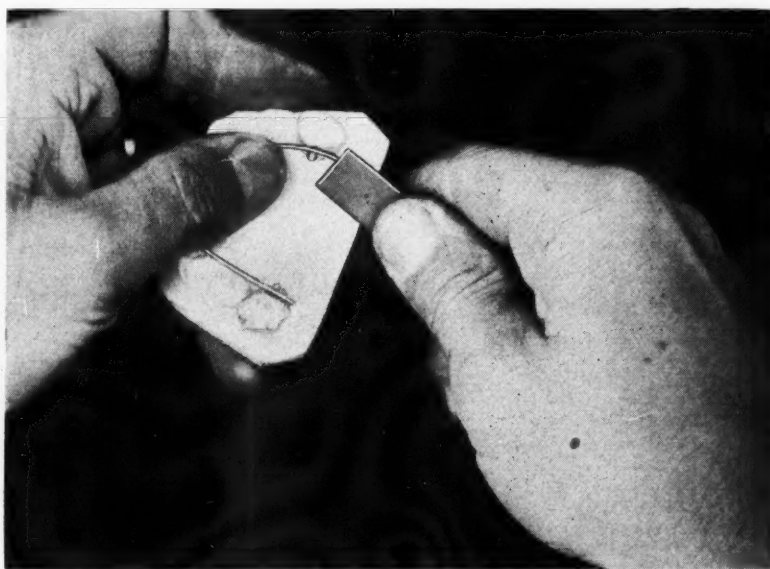


Fig. 39.—Bending the posterior ends of the lingual wire slightly downward and inward.

Step 25.—The next step shows the operation of marking with a file the position at which to attach the auxiliary spring (Fig. 44).

Step 26.—Remove the body wire from the tubes very carefully, and file the ends of the stabilizers to a knife edge. The next step is to attach the lock

to the posterior end of the body wire. First place the flux, and flow a small amount of 14 K. solder to the posterior end of the wire. Take a length of 0.022 inch wire and solder it to the posterior end of the body wire at an angle of 45 degrees (Fig. 45).

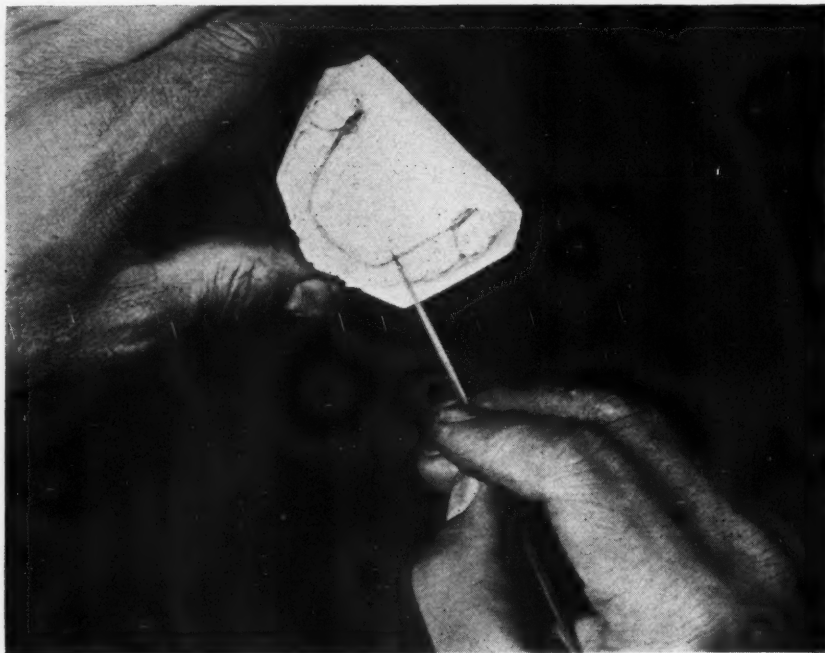


Fig. 40.—Marking with a file the arch where the horizontal extensions are to be added.

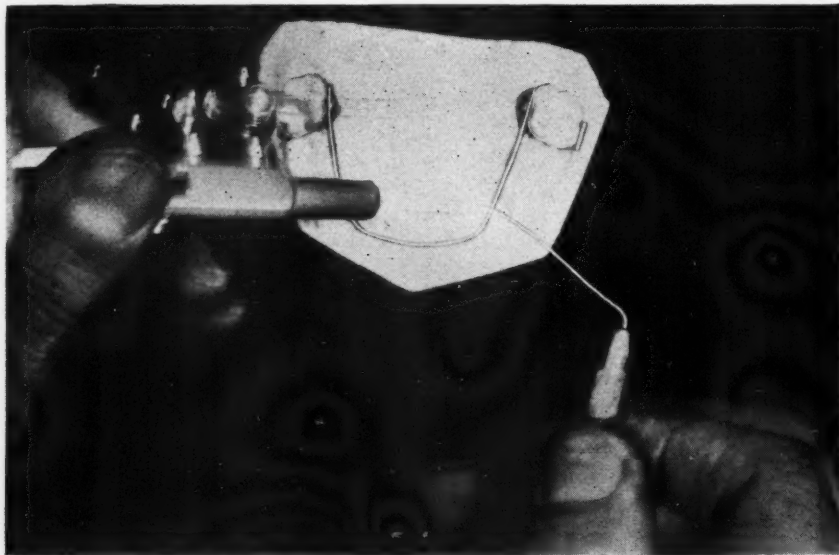


Fig. 41.—Placing 18K. solder on the lingual arch for soldering the horizontal extension.

Step 27.—Grip the body wire in the groove of pliers No. 325 just posteriorly to the half-round wire, using the right hand. With the left hand, bend the 0.022 inch wire around the convex side of the half-round wire (Fig. 46).

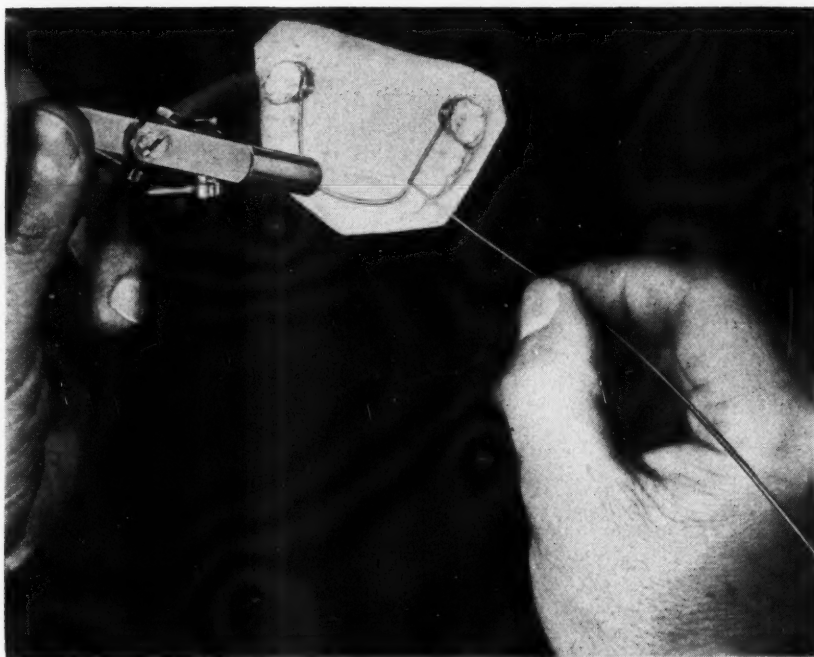


Fig. 42.—Soldering the horizontal extension of Deepep wire 0.022 inch to lingual arch.

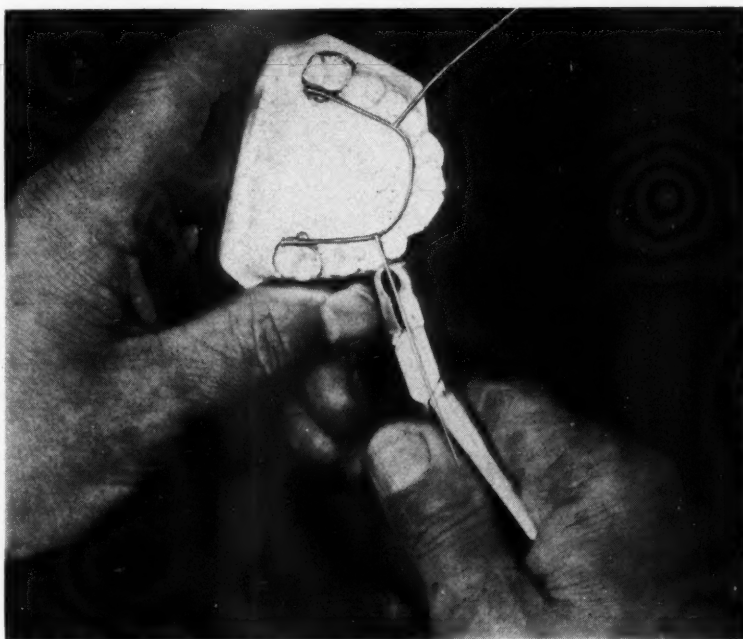


Fig. 43.—Cutting off the 0.022 inch wire with S.S.W. pliers No. 131.

Step 28.—Clip the 0.022 inch wire about $\frac{1}{16}$ inch anteriorly to the half-round wire. Next grip the 0.022 inch wire with pliers No. 325 halfway between the point of attachment and the half-round wire, and bend it toward the occlu-

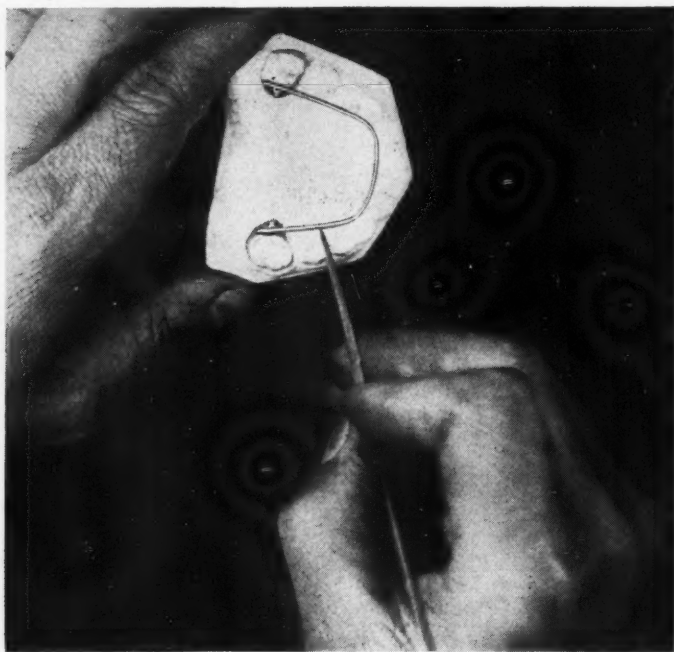


Fig. 44.—With sharp file, marking the position for the auxiliary spring.

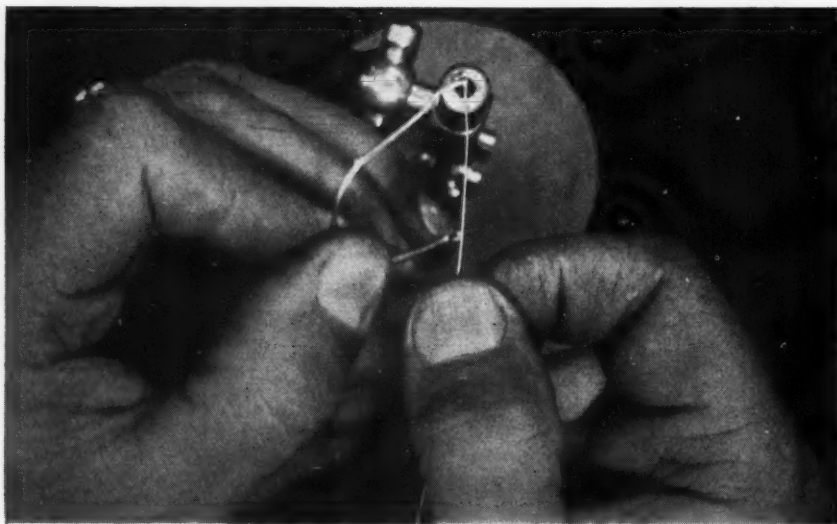


Fig. 45.—Soldering a piece of annealed 0.022 inch Deepep wire to posterior end for a lock.

sal surface and again with a second movement slightly away from the half-round wire (Fig. 47).

Step 29.—Smooth the soldered joint with a file or a stone on a dental engine. Attach a lock to the opposite side in a similar manner. Remove the

temper from the locks by carefully heating them and plunging them in cold water. In some cases it becomes necessary to attach the lock anterior to the half-round wire.



Fig. 46.—Bending lock wire around the end of the half-round post held by S.S.W. pliers No. 325.

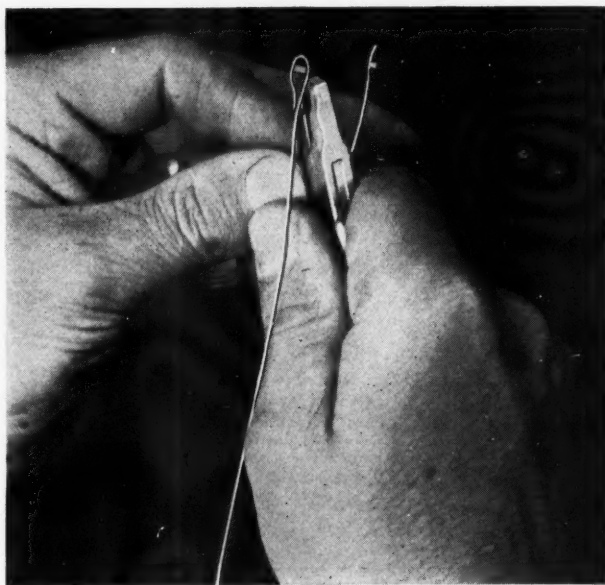


Fig. 47.—Cutting off the lock wire anterior to the half-round wire with S.S.W. pliers No. 131.

CONSTRUCTION OF THE RECURVED SIMPLE SPRING

Step 1.—Mark the position where the spring is to be attached to the body wire. This type of spring is practically always attached midway between the first and second premolars and always on the gingival surface.

Step 2.—Place the flux and the solder on the mark on the body wire (Fig. 48).

Step 3.—Hold the body wire between the thumb and the index finger of the left hand, and with a length of 0.020 inch wire in the right hand, unite it

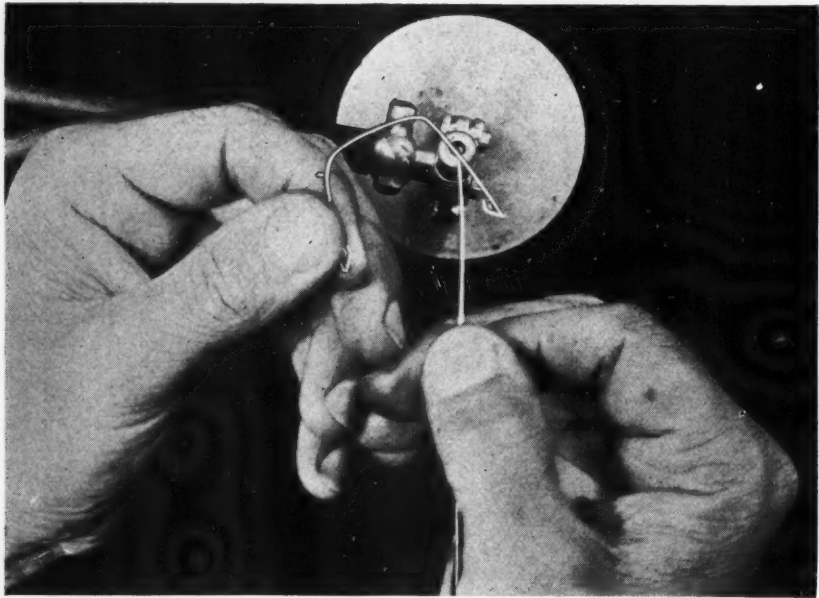


Fig. 48.—Placing 14K. solder on the body wire for attachment of auxiliary spring.

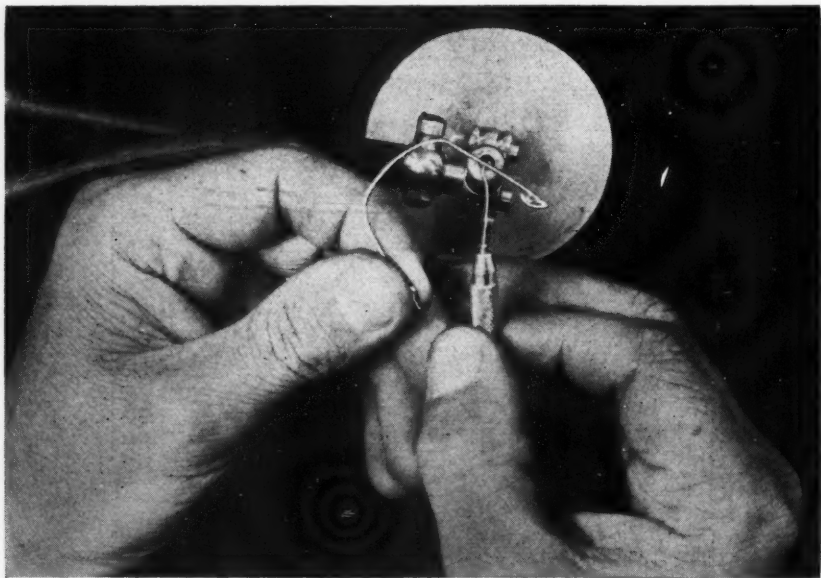


Fig. 49.—Soldering Deepep wire .020 inch to body wire for a recurve spring.

to the body wire at an angle of 35 degrees to the posterior part of the body wire (Fig. 49).

Step 4.—Polish the soldered joint with a fine file or a stone on a dental engine, as it will be impossible to do the polishing after the spring is complete (Fig. 50).

Step 5.—Grasp the body wire anterior to the attachment between the grooves of pliers No. 325 (Fig. 51). With the spring wire in the left hand, between the index finger and the thumb, bend it in a horizontal semicircle,



Fig. 50.—Smoothing end of .020 inch wire with small file.



Fig. 51.—Holding the body wire with S.S.W. pliers No. 325 and holding the .020 inch wire between thumb and index finger.

bringing the free end backward and around to the buccal side at an angle of 90 degrees to the body wire (Fig. 52).

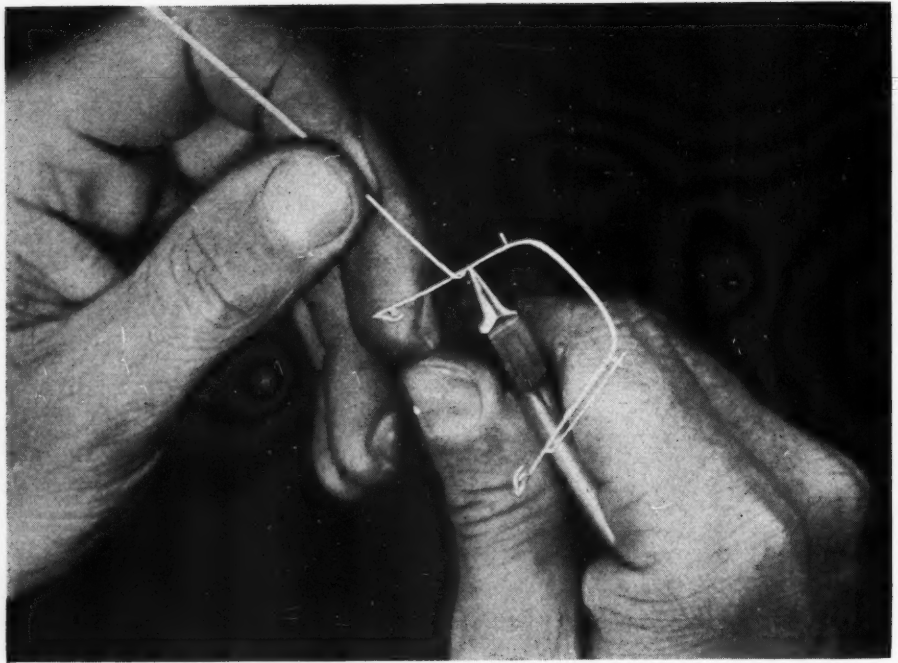


Fig. 52.—Bending the .020 inch wire to a position at right angles to the lingual arch.



Fig. 53.—Holding the .038 inch wire and the .020 inch wire between the grooves in the beak of the S.S.W. pliers No. 325 and carrying the .020 inch wire backwards, parallel, and in contact with the lingual arch.

Step 6.—Grasp the .020 inch wire just posterior to the soldered joint in the anterior grooves of pliers No. 325, and with the left hand carry the wire back to and parallel with the body wire, making a 90 degree bend (Fig. 53).

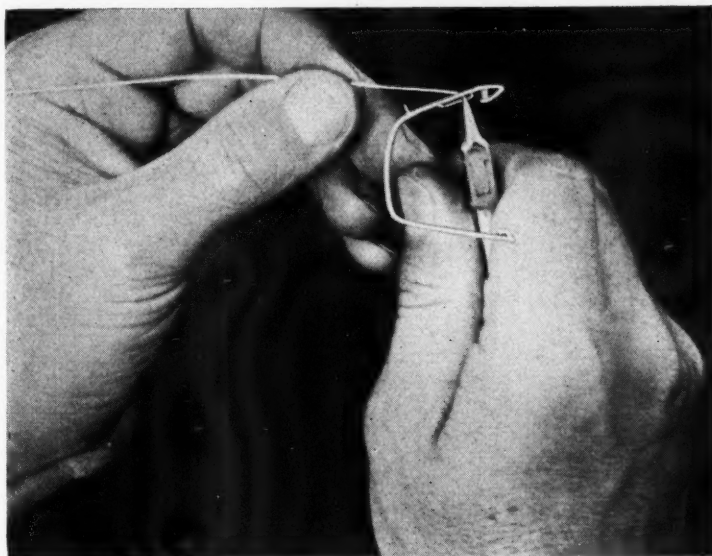


Fig. 54.—Grasping the .020 inch wire in the grooves of the S.S.W. pliers No. 325 and at the point of the posterior end of the distance at which the spring is to extend posteriorly, holding wire with pliers and bending around beak of pliers until it lies parallel to the lingual arch.



Fig. 55.—Closing the recurve portion of the auxiliary spring with S.S.W. pliers No. 325.

Step 7.—Grasp the .020 inch wire with pliers No. 325 just posterior to the second premolar (Fig. 54). And bend the wire again at 180 degrees in a



Fig. 56.—Cutting off the end of .020 inch wire with S.S.W. pliers No. 131.



Fig. 57.—Completing the end of the auxiliary spring with S.S.W. pliers No. 120.

horizontal plane, the free end being carried forward below and between the arch and the teeth.

Step 8.—Grasp the horizontal bend at the posterior part in the first groove of pliers No. 325, and with the body wire resting between the beaks just below the first groove, compress the spring so that it will lie completely under the body wire as is shown in Fig. 55.

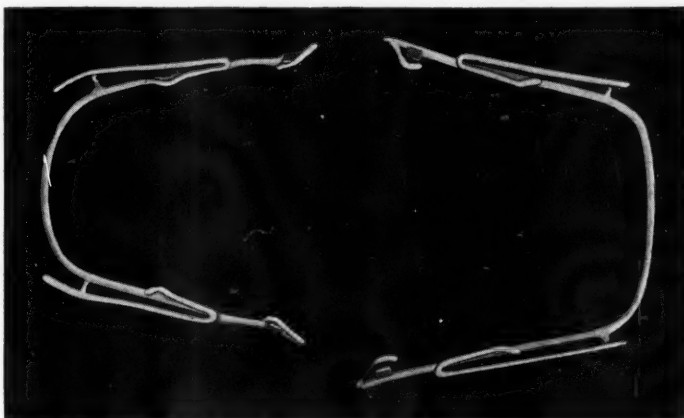


Fig. 58.—Showing the maxillary and mandibular lingual arches with recurve springs.

Step 9.—Cut the .020 inch wire with pliers No. 131 at the length desired (Fig. 56).

Step 10.—Hold the body wire between the index finger and the thumb of the left hand, and using pliers No. 120 curve the wire around the anterior portion of the body wire to the desired position (Fig. 57).

Fig. 58 shows the completed appliance.

(To be continued in July issue.)

THE ASSOCIATION OF ORTHODONTIA AND GENERAL DENTISTRY*

BY WILLIAM DWIGHT TRACY, D.D.S., F.A.C.D., NEW YORK, N. Y.

IT IS perhaps safe to say that the need for interested and friendly cooperation between the general practitioner and the dental specialist is in no instance so important as in those cases where orthodontia is being done.

The very nature of the work is such that the time element becomes an important factor. From the date when the general practitioner refers the patient to the orthodontist to the time when active work ceases a year or two or even more may elapse, and many things may happen in the mouth of a growing patient in the interim. As the science of orthodontia continues to progress, it is to be hoped that the time during which appliances must be worn by the patient can be reduced.

Fundamentally the nature of our joint responsibility and obligation to the patient, it seems to the writer, is self-evident, but we all know of cases where a lack of interest and attention on the part of the family dentist or on the part of the orthodontist has resulted in serious disadvantage to the patient.

While a lapse of this sort is to be deplored primarily because of its injustice to the patient, it is also to be regretted because of its unpleasant reflection upon the dental profession. With proper attention based upon our very definite sense of responsibility in each case and a determination to safeguard the patient from untoward events, these unpleasant experiences need not occur.

It is not to be expected of course that the orthodontist should be burdened with responsibilities that normally belong to the family dentist, but in the interest of the patient as well as in his own interests he should have a watchful eye upon the entire dental situation while the patient is under his treatment. Obviously it is more difficult for patients to maintain cleanliness in the mouth when appliances are being worn. If the patient and the parent or guardian are negligent about the daily hygiene of the mouth, it is essential that the necessity for extra precaution in this matter should be stressed by the orthodontist. If prophylactic treatments cannot be administered in the office of the orthodontist, then he should make arrangements with the family dentist so that the teeth may be periodically cleaned at such times as it can be most advantageously done.

Any evidences of caries or decalcification of enamel surfaces should be cause enough for the patient to be referred back to the dentist for examination and treatment. When a newly erupted tooth appears through the gum if there is any doubt in the mind of the orthodontist concerning the perfection of its enamel development, it should also be called to the attention of the dentist.

This sort of cooperation on the part of the dentist and orthodontist not only minimizes the possibility of serious involvement of the teeth but also

*Read before the New York Society of Orthodontists, New York City, Dec. 12, 1928.

creates a favorable impression in the mind of the parent or guardian of the child. It indicates a real desire on the part of both of the professional men interested in the case to safeguard at every turn the dental welfare of that child.

Upon the general practitioner must rest the large responsibility of recognizing in the early years of the child's life those departures from the normal which come under the general heading of malocclusion. He must have a thorough understanding of the facts bearing upon the serious results that may occur through the neglect of malocclusion. He must have a vivid appreciation also of the fact that malformed maxilla and a mandible out of proper function through disharmony of form may establish a predisposition to other maladies likely to have a serious and pernicious influence upon the health of the individual.

If a child having defects of this type is neglected, the symptoms are likely to become aggravated and in adult life may be the cause of persistent disease in the nasal tract, predisposition to dental caries and periodontal disease and also material interference with facial harmony. So for these reasons and facing the broader aspects of the problem squarely, for general health reasons the dental practitioner must realize his personal responsibility in observing carefully the developing denture of each child under his care.

In these days one hears much of prevention in all fields of the healing art, and in the science of orthodontia the ideal of prevention has developed in wholesome fashion. For this reason, when departures from the normal are noted in the temporary dentition, it behooves the dentist to refer the little patient to a competent orthodontist in order that preventive measures may be instituted at an early date with a view to averting more serious defects later.

There seems to have been a considerable difference of opinion among orthodontists in regard to the matter of early interference where departures from the normal appear in the deciduous dentition, some contending that treatment was indicated in all variations from normality in order to reduce the possibility of complications occurring at the time of eruption of the permanent teeth. Others have been willing to ignore these symptoms and have recommended waiting until the appearance of the permanent teeth. Possibly a crystallization of opinion has occurred in regard to this point which has not come to the attention of the writer.

Frequently the orthodontist, after a careful study of the case, may render valuable service by the correction of unfavorable habits by special exercises and by muscle training which may simplify and in some cases eliminate the necessity for later treatment and a prolonged siege with appliances. In cases where finger or thumb sucking is palpably the cause of superior protrusion, the dentist may quite logically give advice and instruction, but the writer's observation (which covers metropolitan practice only) is that any case involving malocclusion is taken care of better in the office of an orthodontist. In making this statement there is no intention to belittle or detract from the skill and ability of those general practitioners who have made a competent study of orthodontic problems and are therefore in a

position to give advice and treatment. But speaking in general terms, it is better for all malocclusion problems to be handled by the specialists. The parents and the little patients themselves seem to be impressed more thoroughly with the importance of the situation and are apt to give more serious attention to the undertaking when advised and directed by one who they understand is specially qualified to do so.

Many of the old-school dentists stressed, both in teaching and in their writings, the importance of the deciduous teeth, and present-day practitioners are supposed to know and appreciate their value. They are supposed to understand that the retention of these teeth up to the time of their normal exfoliation is not only desirable but also imperative. They are supposed to realize that they are essential not only for physiologic reasons during their normal term of usefulness, but also that their retention has an important and very definite influence upon the welfare of their permanent successors.

This subject has been frequently discussed in the dental literature and yet how commonly are the deciduous teeth neglected and prematurely lost! Whether this is due to carelessness, indifference or ignorance, the fact exists and the results are the same. Until the profession finds a way to educate its members and until dentists become willing to inform parents in regard to the matter, it may continue to be a problem.

Nevertheless, the care and retention of the deciduous teeth up to the time of their normal exfoliation must be set down as one of the primary responsibilities of the general practitioner. Among the dentists who cater to the middle and underprivileged classes there is in all probability an economic phase to this question which can only be remedied through education. But in dental practices where no such phase exists we observe with dismay in many instances a lack of appreciation on the part of the dentist of his responsibility.

To pursue the matter further it must be stated that simply keeping the deciduous teeth in situ is not enough, but that they must be treated in such a manner that their full mesiodistal dimension is maintained. When the deciduous molars become involved with mesioclusal or distocclusal cavities, they must be manipulated in such a manner that when filled their normal contour will be restored and maintained. When the exaggerated contour which is characteristic of the deciduous teeth is lost from two adjoining proximal surfaces of the molars, it permits them to drift together a millimeter and a half or perhaps more, thus reducing the mesiodistal dimension of the arch itself. Teeth thus displaced, instead of being filled with two flat-sided, proximal fillings, should be restored to their normal positions and then supplied with fillings of normal contour.

It is not within the province of this paper to discuss technical details or to suggest ways and means but rather to discuss principles of practice. Suffice it to say then that this desideratum cannot be obtained by the use of ordinary oxyphosphate of zinc cement which is so commonly introduced.

If circumstances arise which make it necessary to remove a deciduous tooth prior to the date of its normal exfoliation, it is essential that a proper space retainer should be inserted as soon as possible. If this is not done, the

adjoining teeth tend to drift into the space, thus diminishing the opportunity of normal development and increasing the possibilities of subsequent malocclusion.

If the family dentist has carefully supervised the care of the deciduous teeth, doing all in his power to safeguard them and protect them individually and collectively, and has established the little patient on a good régime of oral hygiene, the child when necessary will go to the orthodontist under the most favorable circumstances. If the orthodontist then pursues his work with a full sense of his responsibility, not only for the actual orthodontic work but also for his general oversight of the mouth and teeth while the work is being done, the patient will come through in the best possible manner.

The statement that too much orthodontia is being done is occasionally heard and has come not only from parents and practitioners of general dentistry but also now and then from an orthodontist. Just what this statement means is an open question, but the assumption is that it means that some cases which really do not need appliances are taken by the orthodontists and placed under active treatment.

When evidences of malocclusion present to the general practitioner, he is usually inclined to call the situation to the attention of the parent and explain the circumstances using models for purposes of illustration. If he feels that the natural forces present in the case seem to indicate that nature will bring about the desired improvement, he will advocate a waiting policy and make periodical observation. If he is convinced that orthodontic treatment is essential, he will refer the patient promptly to the specialist. On the other hand, if it is what may be termed a borderline case, one where he cannot decide in his own mind whether orthodontic treatment is indicated or not, he would like to feel free to send that patient to the specialist in the full confidence that a frank and unbiased opinion will be forthcoming. If the decision is in favor of treatment, the conditions which make the treatment necessary should be stated; and if the case is to rest without orthodontic interference, reasons for that decision and a tentative prognosis could be given.

There should be no misunderstandings between dentists and orthodontists, and those cases in which they are jointly interested should be carried on in a spirit of mutual and friendly understanding in which the interest of the patient is always the paramount thing.

The writer in closing would like to state that he paid his respects to orthodontia as a specialty and to orthodontists as professional and scientific men in a paper presented at New Haven in April, 1928, from which the following is quoted: "It is impossible to believe that the accumulation of scientific knowledge pertaining to orthodontia, for example, would be as advanced and as comprehensive as it is today if it had not been for the devotion and zeal of that group of dentists who elected to devote all their time and energy to this one field of endeavor." He would like to state further that his personal relations with orthodontists have never been anything but delightful.

THE RELATIONSHIP OF ORTHODONTIA TO PERIODONTOLOGY*

BY ARTHUR H. MERRITT, D.D.S., F.A.C.D., F.A.A.P., NEW YORK, N. Y.

IN ANY consideration of the relationships existing between orthodontia and periodontia, one is at once impressed with the supremely important part which orthodontia plays in the prevention of periodontal diseases. We have become so impressed with the esthetic value of orthodontia, the importance of which cannot be overestimated, that in our admiration for its achievements in this field we are in danger of overlooking what is of equal importance though less obvious, its part in the prevention of disease. And while in the present instance a consideration of its rôle in the field of prevention will be limited to periodontology, it cannot be so limited in any attempt to evaluate its importance in this field. Its influence in the prevention of disease reaches out into far wider fields than that of periodontology. It would be difficult to estimate its importance in periodontia, since it is never possible to measure completely the fruits of prevention. All are agreed that the prevention of disease is vastly more important than its cure, but since no one can ever accurately measure the consequences of disease, it naturally follows that the value of prevention can never be wholly appraised. This is unfortunate, for it places a premium on cure instead of on prevention where it belongs. This explains also why it is that the surgeon occupies a more conspicuous place in public estimation and is more highly rewarded than the prophylactician. There is something in the successful treatment of disease that appeals to the imagination. It smacks of the dramatic. The whole world applauds when the surgeon rescues his patient from the grip of disease. It is something tangible; its value can be estimated. And yet in many instances no matter how skillfully the surgeon may have done his work, he can never wholly restore to the patient that which has been lost through disease, since its progress is frequently attended by conditions that are irreparable and which continue as life-long handicaps no matter how successful has been the treatment. These are the scars, so to speak, that continue to remind one of the vastly greater value of prevention. For as the heavens are high above the earth, so high is the value of prevention over that of treatment; in both instances, so high that no man can measure them. They transcend human appraisal.

This then is orthodontia's contribution to the science of periodontology. It is undoubtedly one of the greatest factors in the prevention of periodontal diseases that we have at our command.

In order to come to a better appreciation of the part which it plays in periodontia, it will be necessary to review briefly some of the more common periodontal lesions met with in daily practice. The first and most important of these is periodontoelasia, more commonly known as pyorrhea alveolaris. Its etiology is complex and in some instances not wholly known. In the light of

*Read before the New York Society of Orthodontists, December 12, 1928.

present knowledge there would seem to be two more or less distinct types of periodontoclasia; one having a systemic background, the other a local. The first type, in which atrophy of the alveolar process seems to be the primary etiologic factor, is believed by Fleischmann and Gottlieb, to be of constitutional origin. In the second type, that in which the etiology is more or less local, it will be found that however much they may differ in some details in these local causative factors, they have certain characteristics which to some extent underlie the entire group and are more or less common to all. These will be found to be a subnormal resistance to infection on the part of the cells of the periodontal tissues and bacteria. If either of these two factors could be successfully controlled, periodontoclasia would not exist. All efforts, therefore, at the prevention and treatment of periodontoclasia should be directed toward their control with such attention given to contributing factors as may be necessary to eliminate them. The first is directed toward the control of the bacterial flora of the mouth by the establishment and maintenance of a high standard of mouth hygiene. The second is directed to the stimulation and revitalization of the periodontal tissues with a view to their better nourishment. One is as important as the other. To limit one's efforts at prevention or treatment to either, is to invite failure. Of these two the latter is the more important, for if resistance to infection be maintained at a high level, bacterial infection will not occur. This is proved by the fact that primitive man with a complete disregard of every principle of mouth hygiene was not subject to periodontal disease. The probable explanation is that the vigorous use given to the teeth and jaws in mastication created a condition of what might be called supernutrition in the periodontal tissues, thus rendering them immune to infection. In addition there was, of course, the influence of heredity, diet, mode of living, etc.

One of the most important factors in the production of well-nourished and highly resistant tissues is normal function. The vigorous use of any tissue makes for better development and an increased resistance to bacterial infection. Modern conditions of life militate against the vigorous use of either the teeth or jaws. The result is to be seen in small and misshapen jaws, in maloccluded and impacted teeth, plus a high susceptibility of these tissues to disease. In the prevention and treatment of these abnormal conditions function is of first importance, and since this is to a certain extent impossible in cases of misshapen jaws and teeth in malocclusion, orthodontia assumes a commanding position in the prevention of all periodontal diseases. Unfortunately for the periodontist and his patient, the part played by orthodontia in the treatment of periodontal diseases is comparatively limited. The age of the patient, the degree of destruction which may already have taken place in the tissues of the periodontium, the frequent loss of teeth, all conspire to limit the usefulness of orthodontia in the field of treatment. In the realm of prevention, however, it is preeminent, since it is aimed at the removal of two of the most important etiologic factors in periodontoclasia; viz., lowered resistance and bacterial accumulation. In the promotion of function through the establishment of normal occlusion a better and more active circulation is assured to the periodontal tissues by which their resistance to infection is in-

creased. And since teeth in normal occlusion are more easily kept clean than are those in malocclusion, it logically follows that the bacterial flora of the mouth will consequently be decreased. Thus it will be seen that orthodontia occupies an important place in the prevention of one of the most common as well as most destructive of periodontal lesions, periodontoclasia. In that type of periodontoclasia characterized by bone atrophy and believed to be due to constitutional factors, there can be no doubt that normal occlusion, contributing as it does to functional activity, is a most important preventive measure in that it stimulates circulation and makes for better nourished tissues, inasmuch as the use of any tissue within normal limits tends to strengthen and make it more robust. While it is not improbable that in some of these cases heredity, systemic diseases, errors in diet, etc., play a considerable part, their influence could undoubtedly be mitigated through functional activity of the teeth and jaws in mastication, a condition impossible of fulfillment when teeth are in malocclusion.

In the prevention of Vincent's infection it likewise occupies an important place. Anyone familiar with the diagnosis and treatment of this disease knows how frequently it manifests itself in the gingival tissues about malposed teeth. This is due to the increased difficulty of keeping such teeth clean, for there can be no doubt that a low standard of mouth hygiene predisposes to Vincent's infection. Teeth in normal occlusion reduce to a minimum the possibilities of oral sepsis and in so doing contribute in no small way to the prevention of Vincent's infection.

Gingival recession, so frequently seen on the buccolabial surfaces of teeth, is in many instances due to the malposition of these teeth. This malposition, plus the improper use of the toothbrush, explains one of the most common forms of gingival recession. Teeth in which the malocclusion takes the form of undue buccolabial prominence are to a certain extent robbed of their normal alveolar support on such surfaces. Not infrequently these surfaces are in part covered only by the gum tissue, which under such conditions is apt to be poorly nourished and therefore more susceptible to atrophic and abrasive influences. Once such recession has occurred the condition is irreparable. There is no treatment that can be given that will restore the receded gingivae to their normal positions. The disfigurement which always attends such recessions, the increased susceptibility to caries, the frequent sensitiveness of these exposed areas, all bear testimony to the vastly greater value of prevention. And in those cases of gingival recession in which malposition has been the predisposing factor prevention through orthodontia is the only remedy, for had such teeth been placed in functional occlusion in childhood, their susceptibility to recession would have been reduced to a minimum by assuring to them a normal alveolar investment. Again is seen the exceedingly important part which orthodontia plays in the prevention not only of periodontoclasia and Vincent's infection but also of that most common periodontal disfigurement, gum recession.

Much has been said in recent years about the influence of traumatic occlusion in the etiology of periodontoclasia. Like most theories containing an element of truth it has doubtless been overemphasized and made to explain

many symptoms, the nature of which was uncertain. It may be defined as an occlusal stress in excess of that which can be borne by the teeth without injury when brought into occlusion, as in the act of mastication. This may be due to stress in excess of normal, as may occur when a mandibular canine occludes with a maxillary lateral, in which case the tendency is to increase the resistive forces resident in the supporting tissues of the teeth by which they are strengthened to bear the increased load. Or it may be due to a perfectly normal stress applied to teeth that for some reason or other are incapable of withstanding it. This latter condition may be caused by malocclusion as a result of which the osseous support of the teeth is subnormal through irregular distribution, or, as frequently happens, it may be due to the fact that certain pathologic changes have occurred in the periodontal tissues themselves, which have deprived them of their normal resistive function. In other words the forces that resist occlusal stress may have been broken down in the periodontal tissues through the development in them of disease.

Noyes and Box have shown that certain histologic changes, called by Box "rarefying pericementitis fibrosa," may occur in the supporting tissues of the teeth, by which they are robbed of their natural capacity to withstand occlusal stress, and that these changes may occur without any clinical evidence of disease. It requires no stretch of the imagination to understand how, under these conditions, even though the periodontal tissues appear to be normal, they may be traumatized, notwithstanding the fact that the stress applied to them in the act of mastication is entirely normal. And this is what frequently happens. In many instances there can be no doubt that the phenomenon known as traumatic occlusion is due, not to excessive occlusal stress, but to some pathologic change in the periodontal tissues themselves by which they have been robbed of their natural capacity to withstand normal occlusal stress. A tooth loosened by disease may come into malocclusion, but in all such cases cause of the primary disturbance was not in the occlusion, but in the supporting tissues themselves.

Another factor to be considered in the breaking down of the periodontal tissues through occlusal maladjustments is tooth loss. It is unreasonable to expect that less than the normal number of teeth will continue to function with the same degree of perfection as that which obtains when they are all present. Especially is this true when it is remembered that the osseous support of the teeth is much less vigorous than formerly. It is possible so to overload teeth representing less than the normal number, that no matter what their resistive capacity it can be broken down by the strain. And this frequently happens when less than the full complement of teeth is required to do the work of the whole. The orthodontist's insistence that all teeth be retained and brought into normal occlusion is sound doctrine in periodontia. Given a full complement of teeth in normal occlusion, there are probably few cases in which the occlusion is ever a primary etiologic factor in periodontal diseases. There can be no doubt, however, that malocclusion, using that term in its usually accepted sense, is an important factor in the production of occlusal trauma, which in turn may be the cause of periodontal diseases. This is true, not simply because the teeth are in malocclusion, but because such teeth are by

virtue of their malposition, less firmly supported than are teeth in normal occlusion and therefore more subject to occlusal trauma. Malocclusion also predisposes to periodontal disease by favoring bacterial development in the mouth.

Unfortunately for the patient, by the time he reaches the periodontist, treatment through orthodontia is usually out of the question, and he (the dentist) must resort to the expedient of tooth grinding. This at best is but a makeshift. At its worst it is capable of causing, and has caused, irreparable injury. In this as in every other phase of periodontic treatment one is brought face to face with the limitations of treatment and made to realize the transcendent value of prevention.

Thus it will be seen that if anything more was needed to convince the orthodontist of the supremely important part which orthodontia plays in the health and well-being of mankind, he has only to consider it in its preventive relationship to periodontology.

58 WEST 47TH STREET.

RELATION OF PSYCHOLOGY TO ORTHODONTIA*

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PSYCHOLOGY fundamentally is the study of the soul. During the course of years the center of interest has shifted from inquiry into the essence of the soul, which distinguishes the living from the dead, to a study of the expression of life, and most recently to the investigation and explanation of human behavior. There was a time when the teeth were regarded as the place of residence of the immortal soul. The holy tooth of Buddha is still worshipped in Ceylon. The Choctaws believed that "The real seat of the human soul is in the bones," and the most permanent part of the bones, longest enduring the ravages of the elements, was the teeth. Thus primarily there is a suggestion of a relation between the soul in psychology and the soul in dentistry.

One may find occasion to meditate upon teeth as they enter into the expression of life upon recognizing that the Hindu and the Arab were wont to deprive a sorceress of the power to do harm by extracting her front teeth, making her unable to articulate clearly, thus obviously placing her magic powers at a tremendous disadvantage. The Chinese regard the presence of a perfect set of teeth necessary and essential for one who would lay claim to being beautiful.

There is evidence of primitive fears related to problems of dental development as, for example, the Basutos in Africa were wont to kill babies born with teeth, while the Bakaas killed a child who revealed maxillary incisors before the mandibular incisors had erupted.

Behavior as related to dental conditions is predicated in Shakespeare's lines regarding one born with teeth, "which plainly signifies that I should snarl and bite and play the dog." Walter Scott drew an analogy from molar action that merits thought, "The teeth bite hardest that are not seen." Teeth enter into the totality of human reactions not merely as an instrument of utility but as an instrument of offense and defense and also as a part of man's esthetic characteristics as witnessed by the expression "My teeth are nearer to me than my kindred."

Ideals of beauty change, and dental forms vary in different ages and generations. Among various people during the ages and under varying social conditions dental beauty has depended upon having teeth knocked out, filed into prescribed shapes or flattened according to a pattern. In Sumatra teeth are filed, or they are rubbed down to the gums, pointed, or the enamel is filed so that the dentin may take some colorful stain. The Felatah ladies of Central Africa prefer to wear their teeth stained alternately blue, yellow and purple.

Thus dental service carries with it the application of psychologic factors related to fears, activity and beauty. The teeth have always been of interest

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as phases of personality. The appearance of the teeth and their relation to the face and the part that jaws may play with reference to the development of the head as well as the face have long been recognized. There actually have been schools of current comment concerning the relation between odontologic characteristic and human character. As recently as 1865 there was an odontologic physiognomist in Paris who held that the teeth were never deceiving indicators of human character. Judgments concerning psychologic undercurrents of human activity were made on the basis of dental form, size and position, even as is done today by physiognomists.

It was believed that teeth pointing toward the palate indicate an inherent impulse to do wrong. Long pointed teeth set far apart were deemed symbols of vulgarity and baseness. To have teeth wide apart, such as in marked diastasis of the central incisors, was accepted as prophetic of dying wealthy, just as large maxillary incisors gave promise of living to attain richness. Large, strong teeth predicated generosity; crowded small teeth indicated a dissatisfied petulant nature; teeth pointing inward revealed silent, severe, economical traits; teeth pointing out heralded a lack of decision and self-esteem. Vertical teeth, meeting squarely, insuring a good bite ever have borne testimony to health, strength and balanced character.

While these indications and suggestions of the relation of dentition to character may seem bizarre, one finds even today many who are content to blame delinquency as well as insanities upon dental conditions such as dead teeth with apical abscesses, irregularities in dentition, and ankyloses as at the temporomandibular joint. It probably would be more rational to interpret delinquency in terms of the dental opportunities existing in communities. The relational effects call for more thorough study than has thus far been given. If the race were edentulous, delinquency would still exist.

Psychology has practical application to all forms of dentistry. All dentists appreciate the importance of gaining the confidence of their patients. More complete confidence may be born from a practical appreciation of elements entering into a state of rapport. Confidence begins in the waiting room, and most dentists' waiting rooms are not designed to give cheer or promise of pleasure to waiting children. The colors, decorations, the ancient literature are rarely chosen to appeal to the young; nor do they tend to awaken an interest in the individual dentist who is responsible for the display. The first personal contact with smile and pleasantry, an evident gentleness in manipulation, and a frank honesty in opinion are of definite value.

The use of the question rather than the declaration in the management of children possesses a definite value. The child has more confidence in his own registered opinion in response to an inquiry than to the statement of the dentist which may temporarily bring about a negative response. "What do you think of this? is more acceptable than "This is what I think of it."

The banishment of fear is vital. The dental chair should be utilized during the period of actual dental work; it is not reassuring as a place of waiting. To keep a child sitting in a dental chair, in an atmosphere charged with the electricity of pain, the sounds of others being distressed, the noise of drills, the sight of instruments, scarcely tends to build up confidence and cheerfulness.

There is an advantage at times in permitting children to inspect instruments, possibly those that have become old or dull, in order that they may have a greater sense of appreciation of dental service, of the carefulness of the operator and his skill in manipulating delicate mechanisms. It is important to give children warning of pain. To advise a child that a procedure will hurt, but probably not very much, actually tends to lessen the sensations experienced by the child who can fortify himself with anticipatory response; saying that one is not going to hurt or will hurt very little when severe pain results brings about resentment, diminished confidence and a personal discomfort which does not conduce to cheerful return for dental attention.

During all stages of work it is desirable to keep the child's mind on the dentist rather than on his services. Conversation even though it be considerably one-sided should be of a distracting character, dealing with events, circumstances and conditions which are likely to appeal to the interest of each specific child. So far as possible the child should be encouraged to talk about his life and experience at school and at play, at home and abroad, because the child's special interest in his own welfare leads to greater freedom from restraint and tension when talking than when he is obliged to be passive and uncommunicative while receiving unpleasant manipulations.

Many juvenile irritations are avoidable. Attention to the teeth is by no means as important to children as to their parents or to the dentist. The child's day is full of many calls for pleasure and recreation. The modern child lives clinging to a daily program. A dentist's appointment is an interruption of pleasure; therefore, a child should not be kept waiting unnecessarily. He should be received promptly and, so far as is humanly possible, be permitted to leave as quickly as the work of the day is completed. Few promises should be made and none should be broken. Regardless of mandatory conditions under which a child comes and despite all temporary or habitual irritability, the dentist should ever manifest a pleasant mood and genial spirit and a willingness to avoid unnecessary and disturbing frictions. His understanding should flow toward the child and encompass him overcoming emotional barriers.

The child has a personality which should be recognized. Most children are having their teeth attended to and visiting dentists under parental direction if not under more definite coercion. It is preferable, therefore, to foster the psychic support of the child in behalf of the dental service rather than to take his presence for granted as an expression of ardent desire. Frequently it is important to build up a new morale in terms of the child alone, irrespective of the fact that his appearance at the office was initiated on the basis of parental enthusiasm for prophylactic or therapeutic odontologic service. The child, like all other human beings, finds pleasure and satisfaction in the recognition of and sympathetic responsiveness to his personality.

All dental work is related to the total dynamics of life. Beautiful sound teeth do not constitute the end and aim of child life. Children are the possessors of the teeth, although too frequently they feel that they are caught up by their own bite. There is a definite relationship between dental conditions and general health in so far as enamelization and caries are concerned. Den-

tal irregularities do not arise from causes located only within the mandibles, but like dental structure and function they have their definite etiologic foundations in underlying conditions affecting general health. The period of time spent in a dentist's office and the attitude of the child toward it, the manifestations of personal discomfort and unrest may be conditioned by nondental factors inherent in the general health situation. Hence it is important for the dentist to appreciate the relation of the child and his teeth to the child's total health. There are possibilities of conversation, but also of education and of constructive friendly relationships in the recognition of the part that is played in daily life by diet, fresh air, rest, exercise and recreation, sunshine, calcium and phosphorous metabolism and normal juvenile activities. It is vital during all dental service to have a thorough appreciation of the effect of child life upon their emotional states. School hours, the difficulties with school curriculum, lack of recreation, too much home supervision, increased susceptibility to fatigue, and prodromal and convalescent states of being, profoundly affect the attitudes of children and influence their personalities in relation to the effects of dental work.

Speaking psychologically every dentist is seeking to condition the behavior of his youthful clients by developing pleasant associations with his office, his nurse, and his own personality. The gaining of confidence and the banishing of fear, the avoidance of irritations and the complete recognition of juvenile personality constitute favorable elements in conditioning behavior for cooperation, for the potential pleasure and for patient willingness to endure what is never an actual source of joy.

The majority of patients of orthodontists are children. They are children with dental difficulties. The word patient carries with it a connotation of sufferer. Fundamentally the one who suffers is of more consequence than the suffering. It is patent, therefore, that the orthodontist deals primarily with a child who secondarily becomes his patient and finally should become his friend. To secure the transition from the second to the third stage requires a recognition of individual variations. All children differ in some particular. Deviation from a theoretic norm of child activity and nature constitutes the element to be recognized as most important in manipulating a personality. There cannot be one pattern or one pattern for dealing with all children. The individual differences should be recognized and utilized by the intelligent thinking of professional men.

One need not dwell upon the differences between boys and girls and those who manifest varied degrees of combination of masculine and feminine propensities and traits. One cannot treat identically in speech or manner the real boy and the one who manifests a large number of feminine qualities any more than one can be successful in employing the same conversation in addressing a truly feminine adolescent and one who has aggressive masculine traits. Sexual variations become more manifest especially during the adolescent period, but they exist at every age period.

The great majority of the patients of orthodontists are between the ages of six and sixteen years, and this age span is such that one has to distinguish differences between children and adolescents. The differences in interests,

emotions and cooperative trends are noteworthy. The immature child, self-centered, largely submissive, lacking in confident independent thinking, is in sharp contrast with the vigorous bubbling dynamic adolescent, thoroughly conscious of his own vigor and keenly alive to his own emotional growth and rational gropings. The inherent physiologic differences of these two types are manifest not merely in muscular and glandular activities, but in emotional variability, temperamental volatility and purposeful thinking in terms of new goals and ideals. The age distinctions and manifest characteristics help to determine the basis of conversations, discussions as modes of approach for eliciting support and assistance during a long period of dental service.

There are some broad noteworthy differences between those of both sexes whose life relationships are centrifugal and centripetal. The extravert who in his thinking, feeling or intuition finds himself radiating with interest in all the world, who finds joy in the heavens above, in the waters beneath, as well as in all earthly things is a far easier individual with whom to live and work than the introvert whose consciousness of life is in terms of his own personal reactions. One looks out, the other looks in; one sees the world, the other only himself. In all children there are elements of both natures, and the degree of success in diverting their minds from their own problems and difficulties while in the dental chair involves an appreciation of the extent to which they manifest dominantly the characteristics of either of these types.

The consciousness of these distinctions of sex, age and personality trends leads to a further recognition of the physiologic and psychologic import of specific qualities of life. There is a vast difference between being in a state of physical health, feeling vigorous and strong, and having some cardiac impairment or a chronic pulmonary disease. The sensitiveness of children is not identical when they are sufferers from cardiac disorders or from asthma or, indeed, at times when their difficulties are not more serious than flat feet, a curvature of the spine or a marked degree of myopia. Some children possess endurance, some are readily fatigable; others fight against pain, still others yield to it; some have learned to control their emotions, others have lacked training in all forms of self-control. One child possesses marked sensitiveness to odors or to noises, while another adores garlic and would thrive in a boiler factory. One child becomes tense at the sound of a drill, while another tries to interpret the buzz in terms of music. There may be disadvantages incidental to position in the family as, for example, the only child who has the misfortune to be pampered and petted and for whom almost any member of the family would be willing to endure the pain which he indicates with willing tears. But there is also the only child who wants to show his manly emotional quality and almost bursts with tension rather than permit his nonemotional cry to issue forth. These are bare suggestions of psychologic facts to be considered when dealing with children as patients. They may be of significance and value in transforming the child as patient into the child as friend, and they are bound to shift the position of the dentist from that of a capable mechanic working upon teeth to a sympathetic and understanding friend working with children.

The prevailing psychology affecting orthodontia is that of salesmanship. The problem is to sell orthodontia to the child. It is obvious that the sales contact at first visit is exceedingly important. The capitalization of the first visit involves selling the self rather than orthodontia, to make one's own personality appeal to the child so that the orthodontist appears to be a person rather than an instrument for the correction of dental irregularities. This involves, obviously, factors which enter into making the dental survey, recording the essential facts, and making necessary judgments concerning the possibility of treatment and the probable duration of orthodontic care. Above all, so far as possible, the first visit should be free from pain. In undertaking a long course of treatment there is no necessity for speed or hasty judgment. It is preferable to wait for two or three visits before undertaking manipulations that are likely to be painful rather than to establish immediate disagreeable associations, and making inquiries regarding habits should be addressed to the child rather than to the parent, governess or other attendant.

Selling orthodontia specifically involves stress upon the physical use of the teeth, the part they play in mastication, the relation of dental position to the growth of the jaws, the influence of mandibular growth upon facial development. Such factors of physical utility may not be as appealing as an emphasis upon the emotional value of dental harmony. The increased benefits that arise from nasal breathing in place of mouth-breathing may be less effective than a consciousness of the joy at overcoming the notable differences from other children. There is a rich satisfaction to be secured by gaining freedom from conspicuousness because of marked prognathism or from under-development of the jaw, or the protrusion of teeth like fangs. Naturally a considerable amount of the emotional value involved in orthodontic service is bound up in social usage. An appreciation of one's own beauty and its value in attracting attention and in holding attention, an understanding of one's beauty as an asset in industry or even of the part it plays in sex competitions definitely strengthens desire for a proper completion of orthodontia. The values of orthodontia are to be presented with periodic stresses, not always harping upon the same theme but by making an appeal to every phase that can create a desire for the dental correction and a willingness to endure prolonged orthodontic service. Parents are sold as to the value of regular teeth with adequate bite. It is the child, however, as a patient who must wish to augment his personality to increase his emotional and social assets through the friendly interventions and technical capability of an orthodontist. And the orthodontist must appear to be not so much interested in teeth, arches and jaws as in facilitating the enjoyment of life for a young friend.

The primary selling of orthodontia involves a secondary effort to overcome indifference and to discourage the feeling of nonproductive attendance. To this end every dental visit should have a pleasurable element in it if possible. The enjoyment may be simple as when the child does not have to wait or spend as much time as he had anticipated. The pleasure may come from a new and interesting fact learned or from being shown something that appeals. Above all is the stimulation from noting an improvement in his own appearance or a favorable comment upon his behavior.

Dentists are far more wont to criticize than to praise the behavior of their juvenile patients. Children are more likely to respond to praise judiciously and adequately bestowed than to regular criticisms. To be told that one is brave and courageous or that one is patient, or that one has a fine disposition, or that no one could act better under the circumstances or show finer spirit is likely to bring about more personal interest, a larger degree of personal satisfaction and even increased confidence in the orthodontist than any system of complaints, criticisms and restraints. To avoid friction is definitely helpful. Regardless of the attitudes and behavior of the child patient the orthodontist has neither reason nor right for losing patience or revealing an unsympathetic appreciation of what to the child is exceedingly serious, unpleasant and taxing his equanimity.

The constant evidence of courtesy and respect for the child brings its own reward. The "please" and "thank you," the inquiries concerning health, welfare, marks, school activities, progress in work, the hope that there was no pain, the respect for the child's time and the countless little courtesies which are involved in friendly contact aid in developing positive relationships between orthodontist and patient. These antidote indifference to the degree that they promote mutual respect, trust and confidence.

Indifference is to be attacked by constructive efforts to promote encouragement. The orthodontic siege is long and frequently children do not grasp that anything is being accomplished. Much is gained by giving the patient evidence of the development of his own problems toward solution. There is good reason for showing pictures and plates of other patients who are further along in treatment, for indicating by casts the state of the child's own mouth pointing out what is definitely to be altered and the extent to which the alteration has progressed. Children cannot look into their own mouths and see the movement that is being brought about by the bands, wires, cusps and pins that may be cluttering up the mouth. To objectify the results under way and the ends to be achieved heightens interest, encourages more active cooperation and generally promotes emotional values diametrically opposed to indifference, dissatisfaction and weariness of the procedures.

All too frequently children are made hostile by statements that are thoughtlessly made or unwisely uttered. A positive and friendly response advances friendly relationships far more than negative remarks and hostile attitudes. Every favorable word or expression of idea coming from the child benefits the professional relationships. To offer inquiries for the child to answer is more likely to elicit desirable answers than declarations on the part of the adult. There is a difference in personal reactions to "This looks better, doesn't it," and "This looks all right." The former tends to bring a positive friendly reply whereas the latter contains a temporary challenge that may bring about a negative comment. It is easier for a child to grant a request such as "Do you mind holding your head a little further to the left" than for him to make a quick willing response to "Move your head over," while the head is being moved by the dentist in the direction desired. The principle involved is one securing the voluntary cooperation of a dynamic personality regardless of the individuality of the patient.

These items seemingly trifling individually, in the aggregate play an important part in establishing the finest and most cordial type of relationships between the child and the orthodontist. There are, however, a number of special factors which grow out of the peculiarities of orthodontic service and which must be recognized because of the psychologic implications.

Orthodontia involves time. Consequently there must be an appreciation of the temporal element in treatment. As has already been suggested nothing is lost by the delay of a few days awaiting an appropriate time at which to begin manipulations which may be productive of discomfort. Similarly during all stages of orthodontic treatment there should be a recognition of the time at which particular factors should enter. The relation of special manipulations to the state of health, the symptomatic presence of special discomforts, or the desire for unusual recreational opportunity merit attention. There are few movements of teeth which must be secured on any day or even during any one week. The orderly sequence of events does not carry with it absolute fixed time tables. The when of a procedure is closely tied up to the why and why-not as well as to how it may be best accomplished.

The time factor is related very definitely to the special factor of manipulation because every mechanical appliance that is fixed in the mouth, every change of bands and wires is accompanied by a few days of discomfort and even pain. The opportunity for subsidence of the temporary annoyance leads to less nervous distress than the constant pushing for effects, without an appreciation of the personal attitude toward the last impact upon the nervous system. The manipulation of teeth extends into the cerebrospinal system and into the sympathetic nervous system. Teeth may be movable in their sockets, but their manipulation involves pulls and strains upon the entire nervous organization of the child; hence the time factor and the manipulation factor together may have a profound effect upon the child.

Another special problem arises by reason of the amount of handling that corrective dentistry involves. It is not merely the stretching of the mouth by the use of fingers and instruments at the time of office visitation, but there is the influence and effect of the constant wearing of appliances and the necessity for unusual and special dental hygiene, during the days when office visitation is not required. Every piece of dental apparatus, even though only a rubber band, that remains to exert pressure and pull constitutes a foreign body in the mouth. In addition to the strain upon the teeth it places a strain upon comfort. Many devices applied for considerable periods of time cause interferences with speech which make some children self-conscious and limit their free expression. Other children are distinctly annoyed because attention is drawn to their dental defects by reason of the conspicuousness of the appliance. Furthermore there is often an attitude of resentment or indifference to the element of care and responsibility engendered by the necessity for extra cleanliness, or for the removal of some parts at night with their re-introduction in the morning. All too frequently there are secondary disabilities that arise as the result of well-intentioned orthodontic procedures, such as the death of teeth and the incidence of caries, which call for further

manipulation and possibly even more painful treatment. These are incidents affecting personal comfort and happiness which cannot be disregarded.

Further psychologic occasions which must be related not only to the psychology of pain but also to the psychology of well-being, grow out of incidental complaints or annoyances such as arise from neuralgias and facial spasms, or from the unpleasantness of minor operations or even from symptoms secondary to impacted teeth. Herein, again, the attitude of the orthodontist toward the child is primary to all that he may do for the relief of these conditions. What he does for these conditions and how, bears definitely upon all the relationships which he has already developed with reference to the specific task of dental correction. Occasionally some unexpected event during the course of orthodontic work is responsible for prolonged services or even an inadequate restoration of the bite because of failure in cooperation or loss of confidence.

Still another factor grows out of the psychology of fear, because the training of children, as well as their inherent differences, is responsible for marked differences in sensitiveness. A child who is sensitive to pain will fear not merely the pain but the dentist who causes it. The one who is sensitive to blood or to fright may become a difficult person in the presence of the slightest bleeding or upon occasions when the dental drill becomes too noisy. Even the sound of the x-ray machine sets some hearts to beating wildly, while the flash from the cathode may frighten severely. There is necessity, therefore, for building up technics sufficiently variable to take cognizance of these different factors of pain, fright, blood and noises involved during the course of prolonged orthodontic treatment. There should be, obviously, great elasticity of preparation and responsiveness on the part of the sympathetic dentist, nurse, dental hygienist, or dental mechanic to meet the sudden distresses of young children or unstable adolescents.

The orthodontist possesses additional values in his relation to some forms of juvenile behavior. Frequently in the interest of his own work he is obliged to aid in building up new habit patterns. It is essential, for example, to recondition children in their attitudes toward habits which are prejudicial to the best orthodontic work. It is necessary, therefore, to aid the patient in overcoming such adverse habits as lip and tongue sucking, sucking of the thumb and one or more fingers. Overcoming the habit of holding the tongue or lips between the teeth or pushing the tongue against the teeth may be more helpful than some of the mechanical wires. Similarly the encouragement of nasal breathing and the discouragement of hasty chewing may become pivotal matters in bringing about adequate restoration of the bite. The application of moral encouragement, the building up of a determination to overcome undesired habits, the gradual development of a new habit with new patterns and morale assume tremendous importance. Harsh criticisms, constant discussion of the subject, derogatory comments have little value compared with the rational explanation of the advantages of the new habits, kindly persuasion to the worth of the new goals and the encouragement of a willingness to continue patient efforts until the new habit is an accomplished fact. Incidentally, success in promoting substitute habit formation depends

upon the child and not upon the parents or the governess. Therefore, the discussion of habits and their rejection or formation should be limited to the child.

It is obvious from much that I have said that the fundamental factor and value lie in patience. The orthodontist must be patient. He has no right to demand patience and respect for his time from a child while he himself is unable to present the pattern that merits emulation. Being patient together is a wholesome relationship. To demand patience with impatience is a malignant pattern for character.

Curiosity on the part of children is almost as natural as fear, and in the dental chair the two are closely allied. One may frequently allay fear by satisfying curiosity. What are you going to do and how are you going to do it, calls for answers, explanations and possibly even informative digression. The result, however, of satisfying specific curiosity and allaying fear in this intelligent manner brings about a cooperative response. The reassured knowing child banishes excess fear; and how much more amenable is he to treatment. Contrast him with the child clenching his fists, clinging to the arms of the chair, stifling sobs and concentrating all nervous energy on the enervating fear. A moment of patient, pleasant exposition can overcome ignorance and rob fear of its most frightening influence.

Referring to fears suggests further the importance of promoting the independence of the child. The child has a personality and is a person. He should not be compared with sisters, brothers, uncles or other individuals but should have an elevation of his own personality on the basis of comparison with his own earlier types of behavior. He should be made to feel that he has grit and courage, understanding and self-control, that he is a real and distinct person who, although attended by a governess, nurse or parent, can undergo whatever is required without having his hand held and without an overflow of sympathy for him. To facilitate this attitude of mind it is desirable that the dental treatment of the child be given in the absence of adults other than the orthodontist and the nurse. It is patent that by thus promoting independence one builds and heightens courageous attitudes and develops finer degrees of self-confidence. More than this, however, it stimulates a deeper rapport and confidence between the orthodontist and the child. It leads to a larger degree of give and take, of self-expression and freedom in viewpoint that promotes mutual interest. Inasmuch as the orthodontist's work involves and affects so definitely the personality of the child, it is important to make the child realize that whatever is being done within his mouth is a matter that he should know about and understand. It is far more useful, speaking practically, to confer with the patient concerning his own mouth than to indulge in private conferences with parents and governess, leading the child to believe that he is not a matter of great concern but is only the one who is carrying the teeth to the office for manipulation. To build up a favorable, dynamic, emotional relationship between the child and the dentist requires the focusing of attention upon the child rather than upon those who attend him. Most parental discussions and explanations that relate to the child can be and quite properly may be made and given

in the presence of the child. Undeniably the child is part of the situation which is being modified through orthodontic study, investigation and practical manipulation. Parents may take a child to the dentist's office, but what is to be accomplished thereafter depends upon the child rather than upon the parent.

Bearing some of these facts in mind it is quite obvious that the orthodontist-child relationship is fostered by showing casts of progress with the child's own mouth and by explaining the purpose of various procedures as well as by discussing the child's interests, his habits, recreations, success in life, social experiences and the like. It must be evident that one builds up friendly relationships in terms of successful contacts of mind rather than in elements of weakness or in factors most likely to lead to failure. To compare a child with Lincoln may be gratifying whereas to compare him with the leading minister might not produce an equally satisfactory response on his part.

When, in the course of treatment, it becomes necessary to give important advice, it should be made specifically. It is almost a waste of time to prescribe more food or more exercise, because the vagueness of such directions carries with it their own defeat. When special cooperation on the part of the child is requisite or required, it is necessary to set up definite schedules, either written or typewritten, indicating what should be done and when, what exercises should be taken, when and how they should be performed. The more specific the direction, the greater likelihood of its being accepted and, more important, carried out. If there are habits that are undesirable such as failure to brush the teeth or tardiness in meeting office appointments, it may be helpful to utilize a chart upon which a gold star should be placed for every successful performance of a direction and a red star for every failure. An objective chart like an objective schedule is more likely to stimulate ready cooperation and to promote an attitude of mind that will lead to habituation and the formation of the socially valuable habit.

Whatever the problem may be, whether in mechanics, service at home, cooperation or personal relationships with the child and family, the orthodontist with his versatility and his greater maturity should be capable of shifting his approach to the child readily and promptly. Habits of brusqueness, rigidity, conventionality and social frigidity scarcely can be of service in dealing with the active, enthusiastic vivacity of childhood. Froebel's dictum of growing up with the children has to be interpreted in as many ways as there are different children. Fundamental psychology must be employed, but the approach to any specific child's problem calls for an effort to think in terms of youth, to look through the eyes of youth and to feel with the emotions of youth. To be a child with one's patient while preserving a measure of that dignity which inspires faith in the adult is an art, but one worth cultivating.

During the process of orthodontologic reconstruction one is affecting the total personality of the child. Willy nilly one works definitely upon the reactions of the child not merely his reactions to dental disability but to his deviation from the norm of human beings. During the process of controlling

dental position one may meet a variety of activities indicative of personality alterations that call for special attention or for reference to a psychiatrist in order to protect the developing personality of the child. Some children, for example, conscious of facial difference, feeling conspicuous because of braces or other apparatus, may show tendencies to withdraw from social contacts. Others may manifest a definite sense of inferiority and may seek to compensate by expression of vanity, boisterousness or, indeed, some form of compromising social behavior. Fortunately there are many who will apply themselves with greater diligence to their tasks and devote themselves to intellectual pursuits in order to escape unpleasant comments and annoyances on the part of unthinking individuals who fail to grasp the meaning of all they are undergoing. There is, however, a group, small but definite, who practically take on the psychology of cripples and who, therefore, need special attention, encouragement and support during the period of dental treatment. These alterations in personality are far more significant when they occur in girls at the age of eleven years or more and in boys from the age of twelve years up. While noisy, boisterous, agitated behavior and disagreeable reactions may give more personal concern to the orthodontist, they are by no means as significant in the life history of the child as are the tendencies to be seclusive, to withdraw from social relationships, and to be increasingly disturbed by emotional reactions disproportionate to their stimuli.

I have said enough to make clear that the main psychologic function of the orthodontist lies in creating constructively a morale that will support an effective personality. I have attempted to indicate the modes by which the orthodontist can recognize the plane of child mentation and make an effort to place himself upon it. It is more important for the orthodontist to grasp the significance of the growing personality than to expect the child to sense and measure up to the standards that are really only occasionally attained by superior adults. Above all I have emphasized the importance of appreciating and considering the interplay of personalities that are involved in every orthodontic procedure rather than the stress and emphasis upon bands, springs, pins, retaining wires and plaster casts. I have implied that orthodontic technology involves and must include an understanding of the psychologic implications of human relationships. If the orthodontist recognizes that besides straightening teeth he is engaged in the important work of helping to straighten personalities he becomes the collaborator of the psychologist and the psychiatrist. Thus the orthodontist has definite opportunities that ally him with the orthopsychiatrist.

CHILD PSYCHOLOGY AS APPLIED TO ORTHODONTIA*

BY J. WILLIAM MALLER, D.D.S., NEW YORK, N. Y.

THE orthodontist is a dental pioneer. He is blazing new trails in preventive, corrective and constructive dentistry. He is also an educator in his own profession. He starts with basic principles and proceeds through involved channels. His work applies itself to human beings in the first stages. The greater amount of his practice is with children; children in the most connotative sense of the word; the quiet, the quick, the ready, the slow, the obedient, the willful. The orthodontist must therefore enter the field of the educator who has studied these types, noted their differences and set forth standards to help solve the child problem. The range of psychology with its ramifications into differential and applied branches is as essential to the growth, breadth and professional advance of the orthodontist as it is to the educator. Modern psychology consists mainly of a large number of problems concerning human behavior. It seeks to enumerate the chief facts of such behavior and attempts so far as possible to account for these facts. Psychology, in a word, is the science of the mental life of living individuals.

The value of the study of psychology to the orthodontist is manifold. In the first place it enables the orthodontist to interpret the nature of human behavior. Secondly, it is of great significance to the dental orthopedist. From him must come the teaching to the general practitioner of the value of good dental treatment for children. He must be instrumental in ushering in the dawn of a newer consciousness in regard to preventive dentistry. Psychology is not satisfied merely in discovering and stating facts and principles of human conduct but is concerned also with searching after the reasons underlying behavior. Therefore, universal causes or stimuli are discovered, which, being observed to be true of those about us, may be assumed to be true of children generally. A main purpose of the study of psychology on the part of the orthodontist is that he will derive from it trustworthy suggestions and assistance in favorably influencing the responses of children to his professional efforts. David Starr Jordan sets forth as his belief, "That there is nothing in all the world so important as children, nothing so interesting. If ever you wish to go in for philanthropy, if ever you wish to be of real use in the world, do something for children. If ever you yearn to be wise, study children."

The orthodontist is a scientist. He works at problems, sets up hypotheses, tries experiments and either reaches a true conclusion or is ready to start over again. As a scientist he is an intensifier. He delves into detail. How often, therefore, does he lose the common touch! How often is his vision limited by the highly technical details of his work! How often do his patients break in on another professional dream! Oh, how often! But what

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about the patients? They are mainly children. Some come to his door, willing and ready with a "show me what you have" attitude; others are fairly dragged over the threshold by their parents. We are at times in the position of the common enemy.

The antagonistic attitude of some children must be overcome at once. It has been and will be overcome when every act of ours develops a spirit of confidence and secures the cooperation of the patient. Every child is endowed with special qualities, abilities, and limitations. No simple rule can be set down for children of all temperaments. The personal equation figures heavily; the impressionability of the child should be observed. Above all put yourself on the plane of the patient, adjust your attitude to the case in hand, and 50 per cent of your difficulty is over. We must remember that our youthful visitors have already formed orthodontic beliefs without our help. Many children through common knowledge and hearsay have imagined impressions, all unpleasant, based on older orthodontic treatments. Then, too, in the mind of the uninitiated orthodontia is dentistry. Any work to be done on the teeth is something to be dreaded. Until we prove differently and conclusively establish popular consciousness that the orthodontist occupies a special field and that he knows his subject, both the subject of orthodontia and the subject he treats, the fear of the dental chair will persist. The orthodontist with a knowledge of psychology will dissipate this fear through the confidence he sets up in the child. Many fears of children can be allayed. Many things feared by a child will do no harm, and many of the expected calamities never arrive. Think how different, how efficient our lives would be if no fear were allowed to enter our lives in our childhood.

We must keep in mind also that torture and pain leave a lasting impression. The child, unlike the adult, sees with imagination and feels what he does not see. We should realize that most of our patients have already visited the dentist before coming to us and have undergone dental treatment with its concomitant pain and discomfort. It remains, therefore, for the orthodontist to hurdle the obstacle presented, to break down the barrier of fear and to guide the child's thoughts, feelings and activities into channels of cooperation and confidence. An understanding of the child's needs fosters respect and affection, which make for harmonious relationship, and it is here that a knowledge of child psychology is invaluable.

Suggestions made to children have greatest force or weight when made by those whom the child admires, loves and honors. We admit universally that the adult of tomorrow is but the matured child of today. G. Stanley Hall says, "There is really no clue by which we can tread our ways through the mazes of culture and the distractions of modern life save by knowing the true and natural needs of childhood and adolescence. Childhood is thus our pillar of cloud by day and fire by night. Other oracles may grow dim but this one will never fail."

I shall in what follows attempt to suggest a few things that the orthodontist may find of value in applying a knowledge of psychologic principles to the child who comes to him for treatment. Many of the suggestions I have successfully carried out in my practice, and many of you I am sure, in

one way or another, have done the same or similar things in handling the children under your care. I shall treat this phase of my subject from the point of view of the advantage of a change in the traditional material associations of an orthodontist's suite, also of adopting a psychologic attitude for its practical value in giving a clearer insight, more toleration, better control and higher standards in solving the problems that come to us from day to day.

Visual impressions have their effect on children. The conventional equipment of the reception room and operating room create situations that make children unhappy. The variety of fearsome mechanical contrivances has exceptional power to excite the young. In many ways the arrangement of one's workshop may modify this whole situation. Why should the appearance of an orthodontist's office associate different emotions than the home? Can we not make our offices as attractive as the home, to ease this transition? Why cling to the traditional, cold mechanical operating room, essential for dentistry and work with adults but unnecessary for our purpose? We treat children. Their birthright is to be merry and gay. Why depress and excite them by furnishing our reception and operating rooms in the same manner as the general practitioner? We have unlimited choice of furnishings, colors and decorations. So-called dignity of decoration in the conventional sense of the word should be replaced by elements that appeal to the child. I dare say that with the exception of the dental chair the orthodontist can satisfactorily furnish his office without the use of a single piece of regulation dental equipment.

The reception room should be decorated in such a manner that it duplicates the living room of a home. The wall decorations and pictures should concern themselves with things children love, such as birds, animals, heroes, play activities, Mother Goose and nursery rhymes. Keeping in mind that our young patients visit us over a period of years, good psychology teaches that the pictures on the wall should be moved from time to time and changed occasionally to keep alive the child's interest and the newness of the surroundings.

The severity of the operating room may be softened by colorful chintz and cretonne drapes and covers for the dental chair. Engines as well as other mechanical contrivances should find their place in the laboratory. Cabinets should be more in the nature of real furniture than the conventional dental pieces. The operating room should also be colorfully furnished and decorated with appealing pictures. The severe white and buff toned wall, erroneously associated with sanitary cleanliness, should give way to pleasing pastel colors. In a word, the orthodontist's suite should be inviting, attractive and appealing from a child's point of view.

The orthodontist should be the child's friend. He should exert self-control by trying to remember his own childhood days, and be wise in discriminating between important and unimportant statements and acts of children. Do not find fault and make an issue out of every trifling thing of which you at the moment do not absolutely approve. "Yes" and "do," should be used more frequently than "no" and "do not," in guiding children's interests, activities and desires. Children should be encouraged wher-

ever possible. Remember that a good sense of humor is a valuable asset to the orthodontist. A courteous gentle tone of voice is a ready means of appeal to reach the individuality of the child. At all times be kind in the care and treatment of children. Love inspires love.

Patience, infinite patience, is always required in dealing with children. Prevent critical situations from arising between yourself and the child. Be sympathetic with the child's point of view, his limited experience, his feelings, his impulses and his limited outlook on life. An interesting commentary in the literature of heredity in recent years has consisted in pointing out the childish traits in savages and the savage traits in children. Suppose the youngster has broken appliances in the past. Will it prevent future breakage to offer sarcastic and destructive criticism? No, much more can be accomplished by wholesome advice as to present and future conduct and by aiming to make the patient the orthodontist's first assistant.

In considering instincts a distinction must be made between the child and the adult, for the percentage of instinctive behavior is much higher in the child. With greater force a child's instinctive tendencies relate to curiosity, imitation, collecting, rivalry, combat, fear, display, gregariousness, travel, achievement and play. All of these instincts, in some manner or fashion, can be moulded by the orthodontist to fit his purpose.

The child is naturally full of curiosity. This trait should be conserved and gratified by the orthodontist by informing the patient of the work done and explaining what the models represent as well as the action of appliances and instruments. Questions asked by children should receive a concise and frank reply. Children love to collect. They are never so happy as when they are storing up what to them are treasures. Most children are reached by little gifts of toothpaste samples, booklets, wires, rubber bands and things of like nature. Children often prize that which the adult considers trivial. There is rivalry among children to obtain the desired orthodontic results. They love to be first in the practitioner's affections. This instinct can be utilized in making for personal achievement in keeping appointments, caring for appliances and necessary mouth hygiene. A child is pleased to be told how clean or neatly dressed he appears. Girls particularly are fond of display and value a compliment about the new dress or new piece of jewelry or new shoes. A child is pleased to note progress. Any improved condition following orthodontic treatment should be visualized for the child's enjoyment. Children are impressed by physical changes, however slow, making for better personal appearance. Achievement is reputable when directed to results which are readily visible.

How to deal with children in matters of discipline is a question often presented to the orthodontist. Efficient disciplinary methods place kindness and sympathy in the first rank, while harshness and crudeness are negative factors. Nagging and scolding should rarely be resorted to, for it is wise to reach a child through mentioning his good points. Bear in mind that children are happy if allowed to do that which they are glad to do. By taking a child into your confidence you please him and discipline becomes a minor factor.

This paper has aimed to call to your attention the meaning of and place of psychology in our everyday labors. It has treated of the normal tendencies of children with suggestions for the practitioner's utilization of the same to better ends. It has emphasized the child and child life throughout. It has preached a bond of friendship between the orthodontist and his young patient. It has suggested changes in the physical arrangement of the office suite so as to eliminate severity and to create conditions more nearly approaching those of the home. It has dealt with the important instincts of the child and suggested how you may utilize them to the best advantage. All of this is purposed to make the orthodontist a real friend of the child and to develop a newer consciousness that a visit to his office is a thing "devoutly to be wished."

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THE BIOLOGIC ASPECTS OF PERIODONTAL DISEASE AS RELATED TO ORTHODONTIC REGULATION*

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MORE and more as time goes on and progress is made in the dental arts the realization of the relationship of biologic principles has compelled those interested in the furtherance of that progress and knowledge to take cognizance of them. The term "biologic principles" is used rather loosely, and often the content of a paper on such principles has no relation to the title. Biology is the term applied to the study of life and its processes including the study of normal processes and adjustments made by the vital forces when undue strain is brought upon living tissue. It is necessary for us to give a great amount of thought to this question of adjustment. After all, everything in life depends upon a continual adjustment of some nature, either physical or mental. We are being called upon to orient ourselves in some manner every day of our lives, and our success, whether the goal be health, wealth or fame, or a combination of them, depends greatly upon our powers of adjusting our processes to changes and strains forced upon us in life. The process of adjustment from a physical standpoint is rather complicated, depending upon many biologic processes. The most important process to be considered is the physiologic. The study of normal function and of aberrations from that normal, a term we must use in a relative sense, is without question the foundation upon which we must build our mansions.

The tendency in the study of disease has been to consider it as a definite entity without a correlation of the multitudinous processes which have led up to the clinical or microscopic entity we have to cope with. A more intelligent and valuable way of considering disease is that of visualizing the normal or healthy tissue or organ and the changes leading up to aberrations in function,

*Read before the Southwestern Society of Orthodontists, Dallas, Texas, Jan. 2, 1929.

which always exist in disease processes. We can no more study disease by considering it alone than we can study the ethics of life by studying individuals of specific ages with no thought given to the problems presented at different ages. Let us then consider the relationship of healthy tissue to diseased tissue as we might consider youth and old age. Let us never lose sight of the functional changes which have arisen and may be of a primary or secondary nature. Too much mystery and shadow have been cast upon the deeper study of disease by segregating it from the study of health.

There still appears to be some question as to just what does constitute a periodontal disease. Any abnormal condition of the gingival tissues, alveolar process or periodontal membrane collectively or individually constitutes periodontal disease. Each tissue presents its own variations, and hence a peri-

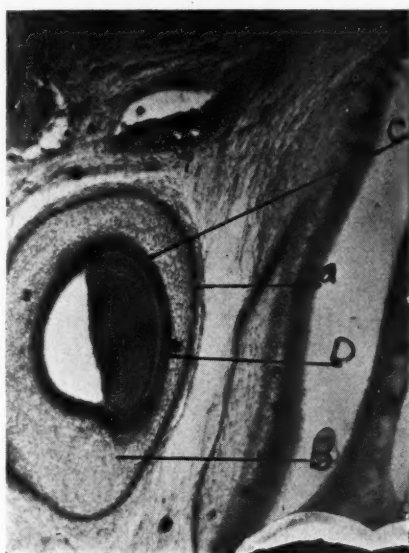


Fig. 1.



Fig. 2.

odontal disease affecting more than one of the tissues is usually a very complex process. As a usual thing the majority of clinical cases are merely biologic aberrations in the relationship of certain tissues at a given time or of functional changes accompanied by the usual tissue reactions.

Necessarily, if we are to consider biologic reactions, we must give thought to the various tissues involved from developmental to functional activity and then to biologic changes which are occurring as tissues become older. The enamel organ presents structures which take certain forms, relationships and functions which from a biologic standpoint explain many of our periodontal diseases. An attempt will be made to show the relationship of various biologic principles to orthodontic treatment concerning the reactions of tissues to the application of the necessary forces. The data should be considered from a standpoint of biology and adjustment to bring about normal function and health without too many irremediable scars having been left in the tissues involved. These scars may be actual or merely inhibitions of adjustment potentialities.

Fig. 1 shows an early stage of development of the enamel organ. Notice the various layers of epithelium present: *A*, the external layer composed of cuboidal cells; *B*, the stellate reticulum composed of star-shaped cells. This layer serves as the source of nutrition to the enamel organ. There are no blood vessels present in these epithelial layers, and due to the fact that the stellate reticulum finally disappears as nutritional activity lessens leads to the conception that this layer has a nutritional function. *C*, the stratum intermedium is composed of a cuboid type of cell, and *D*, the ameloblastic or ganoblastic layer. The term ganoblastic is coming into use more because it is a pure Greek word and not a Graeco-Latin hybrid. This layer is the formative layer, and the cells are of a columnar type. The developing pulp is shown with the outer cells beginning to show differentiation into odontoblasts. Fig. 2 shows a later stage of development with the epithelial layers further differentiated and some changes in the relationship of the various layers. Fig. 3 shows a cross-section at about the same stage. As the developmental process advances, the stellate reticulum disappears leaving two definite layers, the

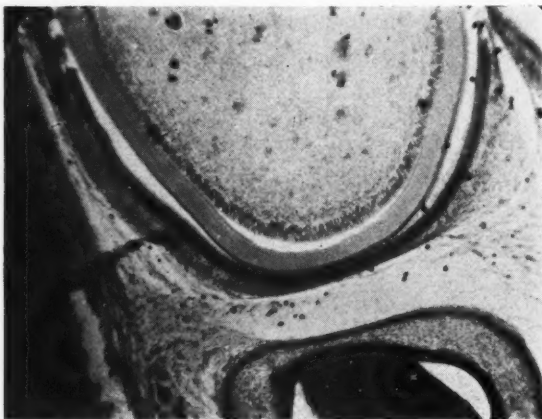


Fig. 3.

first of which is composed of the external layer and stratum intermedium. This layer is called the secondary cuticle, and as the tooth erupts it coalesces with the mouth epithelium to form the cuticula dentis, a structure which is present throughout life and assumes a very important biologic position in all changes of the periodontal tissues whether artificially produced or not. Before going too far it is best to consider the second remaining layer of the enamel organ, which is composed of the ganoblastic cells and is called the primary cuticle. It covers only the enamel of the tooth and is a calcified structure while the secondary cuticle or cuticula dentis is a hornified structure. These two cuticula are fused over the crown of the tooth to form Nasmyth's membrane. This means that Nasmyth's membrane is composed of two layers and not one. This fact does not interest us as much as do others in the consideration of this particular subject.

The knowledge of the process of eruption of teeth has been greatly augmented in the past few years by the work of Gottlieb and Orban as well as others. The conception now is that the teeth are continually erupting and

were we to live long enough our teeth would be exfoliated biologically and not pathologically, provided the artificial and unnatural forces we are compelled to battle were not brought to bear upon the teeth and supporting structures. Eruption must not be considered merely as a question of the tooth's moving outward but more as a question of its becoming exposed. The cuticula dentis spoken of previously is continually growing apically along the cementum after the cemento-enamel junction is reached. The clinical crown, that which is seen upon examination, does not become the same as the anatomic crown, that portion bounded by the cemento-enamel junction, until at about the age of thirty years under normal conditions. The two crowns become one and the same thing at the stage of eruption of the teeth when the superior attachment of the cuticula dentis is at the cemento-enamel junction. This attachment of the cuticula dentis is called the epithelial attachment and extends over a small portion of the tooth. Normally there is no gingival crevice, which fact is definitely a contradiction of the earlier and more commonly known dental histologic teaching. The cuticula dentis in growing apically and being firmly attached to the tooth surface affords no opportunity for there being any crevice formation normally. The epithelium does not grow down at the same rate of speed on any two portions of the tooth, so a tooth must be considered as being erupted to a different level at all portions. The relationships of the gum tissues, peridental membrane and alveolar process are all more or less dependent upon where this epithelial attachment is. The alveolar process develops from functional stimuli after the cementum and peridental fibers have formed, and only when these structures are present is it possible for there to be alveolar bone. As the epithelium grows apically along the root, the peridental fibers must have undergone changes causing their loss, which in turn has resulted in the loss of a corresponding portion of the alveolar process because that structure resorbs when functional stimuli are lost as previously stated. The apical growth of the epithelium along the cementum takes place probably because the vitality of that tissue is lowered due to many factors, and the epithelial down growth is really a walling off process. All these processes are biologic in nature and not pathologic, but the rate of their advancement may become so rapid that the pathologic stage ensues and any of the various types of periodontal diseases may follow.

It is not usually recognized that the alveolar process, that structure which of course affords probably the greatest amount of physical resistance to orthodontic regulation, is different on the mesial and distal surfaces of teeth. The force of occlusion is always mesial, and there is always a mesial movement of teeth which means there is a continual resorption and osteogenetic process taking place at all times. The distal alveolar process presents strata of so-called bundle bone to compensate for the pulling away of the teeth toward the mesial, and the mesial surface presents small resorbing areas due to pressure and to allow the tooth to move mesially. During all these complicated biologic reactions the various periodontal tissues must be adjusting themselves to various changes. The gum tissue must be changing its position always as the foundational structures are changing position, and the periodontal

membrane must be functioning as a formative organ continuously as well as carrying out its many other functions.

Orthodontic regulation in bringing about the many changes it does in the position and relations of the arches and individual teeth must disturb these biologic and physiologic changes greatly, and the relationship of these induced changes to periodontal disease during and shortly after treatment as well as later on in life should be very much in the mind of the orthodontist at all times. Periodontal diseases brought on by incorrect application of orthodontic principles simulate very much those conditions brought about by other artifi-

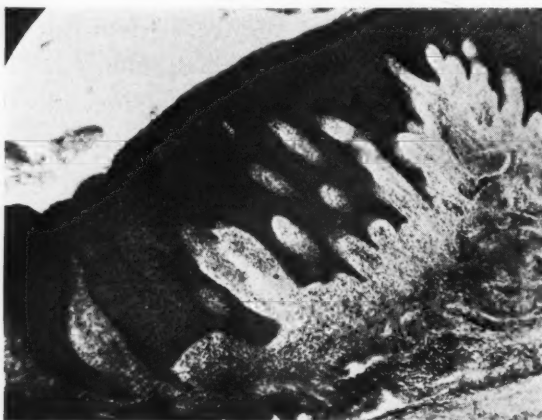


Fig. 4.



Fig. 5.

cial and mechanical etiologic factors. Clinically, in childhood orthodontic treatment produces a pronounced reaction in the gum tissues with loosening and soreness of the teeth. Evidences of peridental membrane disturbances are very plainly seen when incorrectly applied measures are carried out. The gingival disturbances thus set up usually resolve quite promptly with probably very few deleterious effects of a lasting nature. The histology of the gum tissues favors rather a rapid return to health when irritating forces are corrected. Fig. 4 shows a low power view of a gingival inflammation. Fig. 5 shows a high power view of Fig. 4. However, irritation due to incorrect plac-

ing of bands may break the epithelial attachment and cause a proliferation of the epithelial cells thus speeding up the growth in an apical direction. This is a biologic reaction, as the process would have resulted eventually but so many years later that from a practical standpoint we would be compelled to

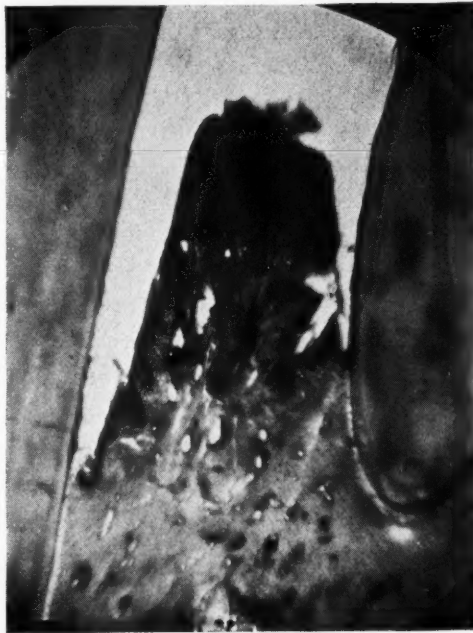


Fig. 6.

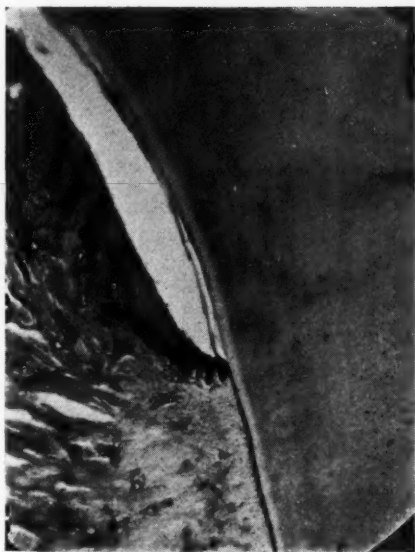


Fig. 7.



Fig. 8.

consider the orthodontic regulation the real etiologic factor of a periodontal disease later in life. The evidence as to just how much of this type of disturbance has followed such procedures must necessarily be somewhat meager due to the fact that not only are there comparatively few cases which were treated sufficiently long ago for comprehensive study but also the gathering

of material for microscopic study is rather difficult. It is expected that the statement concerning the paucity of treated cases will bring forth some comment, but relatively speaking orthodontia is in an early stage of development, as there has not really elapsed sufficient time for an accurate check on results from a periodontal viewpoint at least. Fig. 6 shows the epithelial attachment near the apical third of the root, not due to orthodontic regulation, of course, but showing how the epithelium can and does grow in that direction more rapidly than would be considered normal. These sections are from the jaws

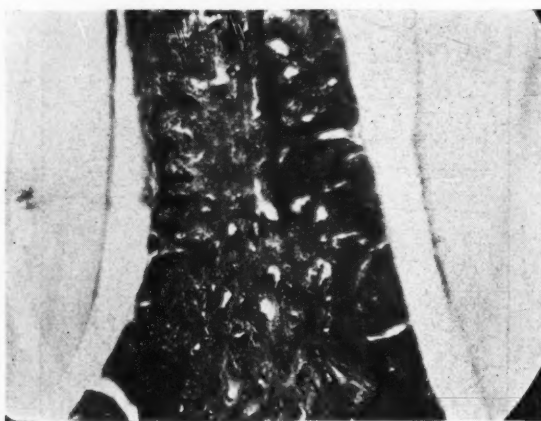


Fig. 9.

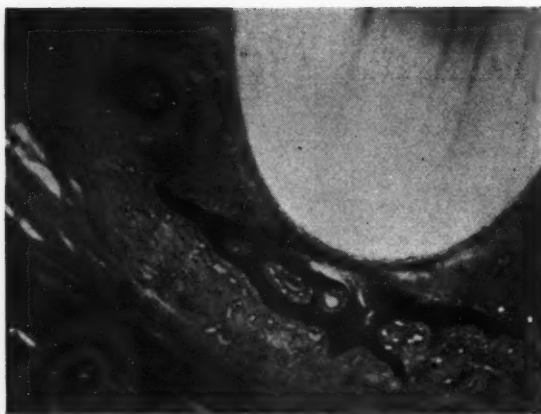


Fig. 10.

of dogs, but human tissues present reactions which are quite comparable. It is plainly obvious that the investment of these teeth has been materially destroyed, and it is only a simple question of physics to decide that their chances of withstanding masticatory stresses are slight indeed. Such stimulations of downward growth of the epithelium might indeed be important factors in the development of traumatic occlusion after treatment has been supposedly completed. Traumatic occlusion is a subject which still demands a great amount of study. It is undoubtedly a biologic disturbance and probably cannot per se be considered the initial cause of periodontal lesions, but that subject cannot be discussed in this paper. It will be noticed in Fig. 6 that there is no bone showing even at these deep levels. Serial section of this area of

course would undoubtedly show some bone structure, but it is easily seen that a great portion of the process has become resorbed. Fig. 7 shows the epithelial attachment very clearly and shows the relationship between the gum tissue, tooth structure and periodontal membrane. Fig. 7 shows a different area similar to Fig. 6. Fig. 8 shows the epithelium at the apex of the root. This section has been cut somewhat diagonally through the tissue so the relationship of the structures is probably somewhat incorrectly shown but not enough so to interfere with the diagnosis that the biologic reactions have been speeded up greatly. Fig. 9 shows a cross-section of a dog's jaw presenting proliferative epithelium again. In all these sections, of course, round cell infiltration and other pathologic pictures are shown. Fig. 10 shows an area of proliferated epithelium in cross-section.

To make this data of practical value it is necessary to use it in visualizing some of the changes which are taking place when arches are being expanded and individual teeth are being moved in any of the various possible directions. There is no need of mentioning specific cases, types of appliances or other factors which might necessarily have to be taken into consideration because these biologic and physiologic reactions take place in every case under all conditions, but the necessity of these taking place without too much abnormal function and stimulation of tissues occurring is great indeed. The adjustment powers of individuals and of individual teeth vary greatly, and the orthodontist must govern himself accordingly.

Certain metabolic disturbances may influence the progress of cases greatly, and these various changes developing into periodontal lesions occur in such cases because the adjusting powers of the periodontal tissues are lessened, and once the physiologic changes become aborted, the adjustment may not be made at all, or scars may be left which have far-reaching effects during the entire life of the patient. Such areas may always have a lowered physical or biologic resistance to any of the stresses of life and may be unable to react favorably. The retention of the individual tooth compares with the span of life. Our bodies adjust to illnesses and other physical and mental strains up to a certain period, and then an occasion arises when the adjustment does not take place and death results. So it is with the dental apparatus, and the regulation of irregularities of the oral cavity is an important agent in aiding or inhibiting these adjustments. The fact that irregularities are present indicates that there is some biologic disturbance back of the whole picture that should be a warning to the man who endeavors to correct the clinical picture. Various etiologic factors are recognized concerning malocclusion, but except for those irregularities caused by actual trauma they are all biologic in nature.

The loss of the human teeth due to the breaking down of the investing structures is without question one of the greatest of dental problems, and as time goes on it appears that most of our treatment is symptomatic with the hope that normal physiology may be instituted so these teeth may be functioning organs retained by the individual without danger to his health. Orthodontia constitutes one of the hopes of the future of the human mouth, but irregularities cannot be accepted as simple abnormal relationships of the teeth because always there is something of a complicated nature back of that abnor-

mality. The consideration of the development of the various portions of the enamel organ and their biologic relationship to the health and physiology of the oral organs will explain many clinical symptoms. It has only been recently that the actual changes which take place in periodontal diseases have been even partially understood; and now that a better conception of them is at hand, those engaged in the other branches of dentistry should be thoroughly cognizant of them in order that the future health of the mouth may be retained and abnormal function righted without too many deleterious biologic effects.

If a mouth under treatment is watched closely and measures are taken to reduce various stimuli when objective and subjective symptoms arise, usually adjustments will take place without much injury resulting. The tissues will regain their normal tone, and the normal biogenetic forces will again be stimulated to aid in the correction of the abnormality. If symptoms are allowed to appear and pass away without any attention being paid to bring about a balance between the adjusting powers of the tissue and the orthodontic stresses, one may rest assured that the correction of the occlusion probably has been obtained at great cost. Many mouths are presented for treatment with a history of orthodontic regulation having been undergone at some time and with the superficial appearance of a good result having been obtained, but the investing tissues have finally become diseased. These tissues have not been able to adjust themselves to the various types of extra-alveolar leverage brought to bear upon them as they erupt further, due possibly to results of orthodontic treatment. There necessarily must be some equivocation about these matters as about many other dental problems, but the evidence at times bears quite heavily against certain types of orthodontic regulations. Various schools of orthodontists have many different ideas concerning the efficacy and lack of danger concomitant with their usage. All types of appliances appear to possess valuable qualities, but there is much condemnation of many of them due to the fact that periodontal disease of rather an obstinate nature occurs. This may be explained by the consideration of the different grades of adjusting powers of individuals and the normal biologic reactions of tissue. The successful orthodontist must train himself to be able to diagnose soon after the beginning of treatment how tissue tone is being retained and whether or not untoward abnormal reactions are being set up. When such a condition exists, orthodontic regulation will be more firmly placed on a scientific foundation and can result only in conditions being brought about which will have invaluable effects locally and generally both as a palliative and prophylactic measure.

Those interested in the microscopic study of the mouth tissues under various conditions are indeed anxious that the knowledge gained may have practical value to the practitioners of dentistry and especially to the orthodontist who must artificially produce changes of great scope.

DISCUSSION

Dr. S. R. Parks, Dallas, Texas.—The function of the stellate cells is probably not that of supplying nutrition to the enamel organ (Broomell and Fischelis) but is that of replacing cells of the so-called intermediate layer. The function of nutrition is taken care of by the vascular tooth sac.

Physiologic exfoliation of the tooth probably could not occur, as such an occurrence would be prevented by the constant deposition of cementum (Gottlieb) which would make it possible for the anchorage of new fibers of the periodental membrane (alveolar periosteum), thus continuously establishing new support for the tooth.

I see no good reason for using the term *ganoblast*, since *ameloblast* is the Basle-Nomina-Anatomica terminology established in 1895 by the International Society of Anatomists whose entire recommendations have been accepted since that time.

It is interesting to note that within the last decade every phase of dentistry except orthodontia has shifted its main interest from various individual problems peculiar to its own phase of dentistry to the one common problem around which the science of orthodontia is largely built, that is, occlusion.

Ten years ago a perfect impression was the ideal which was striven for by the prosthodontist. Today I am told that dentures which have been made from fair impressions but whose occlusion is perfect, if there be such a condition, are the ones which render greater service.

Today the leading problem in periodontia is ideal occlusion, for we realize that every force originating in the muscles of mastication is reflected through occlusion to the periodontium, and any malocclusion means injury with a breaking down of the periodontium as the resulting sequel.

Dr. G. A. Dorsey, anthropologist of the University of Chicago, after examining hundreds of skulls of a savage race off the coast of southeast Asia, made several interesting observations: No cavities, no teeth lost, perfect alignment, and perfect occlusion. The explanation of this is obvious. The food of these savages was coarse, hard, and largely unprepared, and to masticate it the dental mechanisms had to function. Hence good development. Here in the south we have observed that the pure strain negro has a jaw bone about one and one-half times as thick as the white race, also that one seldom sees a negro, except where the blood is mixed with the white, with teeth out of alignment. Observing these conditions leads one to recall that the negro has been civilized only one and a half centuries while the Anglo-Saxon has been civilized for some fifteen to twenty centuries. Certainly the loss of our teeth is one of the prices we pay for civilization. It would seem that the jaw bones are becoming shorter without a compensating decrease in the mesiodistal width of the teeth, hence a so-called crowded condition.

The best preventive treatment for periodontoclasia is orthodontia, and if orthodontic treatment could be carried out where indicated, periodontia would almost become passé as a phase of dental science.

GAS OXYGEN ANESTHESIA IN DENTAL SURGERY*

BY HARRY J. FIELD, D.D.S., NEWARK, N. J.

THE purpose of this talk is not so much to discuss technic of administration as to consider some of the many problems which present to every dental anesthetist. You have all undoubtedly read papers in the various dental journals whose authors advocate submitting patients to a complete physical examination before gas oxygen administration. To be sure, blood counts, coagulation tests, urine analyses, stethoscope examinations, basal metabolism tests and many others are highly commendable procedures of no little value; but unfortunately in the office of the general practitioner of dentistry they are utterly impractical. To reminisce for a moment, may I relate a case which I daresay is typical? The patient was all ready for anesthesia. I asked my assistant to take the pulse while I arranged some instruments. The patient became so thoroughly alarmed during this simple procedure that he absolutely refused to be anesthetized. No amount of persuasion could convince him that we did not fear his ability to survive the operation. Without wishing to be cynical I venture the opinion that the general public is as yet far from the stage where they will consider the private office of a dental surgeon in the same light as they do a hospital. To face the problem from a purely practical point of view, how then, under these circumstances, is the dentist to determine indications and contraindications for general anesthesia? My answer is inspection.

I have a firm faith in the inspection phase of physical diagnosis. It is said that one of the most famous internists in all medicine had the remarkable faculty of correctly diagnosing any condition by merely looking at the patient. While none of us needs aspire to such proficiency, it is surprising how much one can learn about the type of patient by a keen-eyed, scientific inspection. The general contour of the body, peculiar mannerisms, facial expression, the eyes (particularly the pupils), the mouth, the breath, the color and texture of the skin, the fingers, the nails, etc., can all be observed quite casually without causing the patient any alarm and are yet of no little value in determining how much of a surgical risk any patient is.

Primarily I wish to dispel the general false impression about the contraindication for gas oxygen anesthesia in the presence of any abnormal heart condition no matter how slight. Never be terribly alarmed when the patient says, "Doctor, I have a weak heart." Remember that no known anesthetic is safe when the heart is badly diseased. Patients with such severe heart lesions, fortunately, rarely find their way into the office of the dentist and when they

*Read before Post Graduate Section in Exodontia and Anesthesia, Newark Dental Club, March 8, 1929.

do are very careful to give you quickly a complete history. In all other minor heart disturbances gas oxygen is perfectly safe and often definitely indicated to lessen surgical shock.

The question of age limitations has frequently been asked. The records show that the youngest patient ever anesthetized with gas oxygen was a three-months old infant, the oldest a man of ninety-two years. In my practice I have anesthetized thousands of children from three to seven years old and can report that I find it an eminently satisfactory method for quick, efficient extractions. The anesthetist must constantly bear in mind that the anesthetic balance is very delicate. Deep anesthesia should be carefully avoided. It is dangerous. I prefer a light anesthesia for such youngsters, almost an analgesia. While the reflexes will not be entirely eliminated, the child will have no pain, and may I emphasize that the loss of sensation is the fundamental purpose of all anesthesia. To a lay onlooker the reflex actions during light anesthesia seem to be conscious responses to pain stimuli. Consequently I earnestly advocate and practice in my own office, as a routine measure, the disposal from the operating room of everyone except doctors and nurses. A sound-proof operating room is essential if you would not alarm anxious mothers and others in the waiting room. At all times the anesthetist must be certain that the patient is sufficiently anesthetized as to feel no pain. Aged persons are usually good anesthetic subjects, though they must be watched carefully and cyanosis avoided lest the blood pressure rise too high.

Among a list of good subjects for anesthesia I would include:

1. The debilitated
2. Individuals of a placid phlegmatic temperament
3. Middle-aged women
4. Anemics

The list of least favorable subjects would include:

1. Inveterate smokers
2. Alcoholics
3. Highly neurotic and excitable people
4. The obese
5. Hyperthyroids

You will notice that the various types can be quickly recognized by inspection: the weak patient with drawn face, haggard look, nonresistant and usually thin; the calm, cool, healthy looking individual; the anemic is quickly observed by the abnormal pallor of the skin, rings under the eyes, thinness, etc. For this first group a general principle which the anesthetist would do well to follow is to use less nitrous oxide and more oxygen. Particularly with anemics use larger quantities of oxygen. Start with 25 to 30 per cent oxygen and work back slowly until the proper ratio of gases is found.

In the second group the heavily stained fingers and teeth of the smoker, the discolored nose and alcoholic breath of the drinker, the nervous jumpy behavior of the neurotic, the staring eyes of the hyperthyroid, are all very apparent. In these instances use less oxygen and more nitrous oxide. For the

skillful anesthetist McKesson's secondary saturation technic is often the only way to get a satisfactory anesthesia unless premedication is resorted to.

In a certain percentage of cases premedication, while not absolutely necessary, considerably lessens the strain on both the operator and the patient and therefore is certainly indicated. I suggest as premedicants morphine, chlortone, or hyosein-morphine-cactin (H.M.C. No. 1 tablet, McKesson). The last mentioned is dissolved under the tongue forty-five minutes before administration.

Regarding length of anesthesia, there unfortunately still exist many thousands who feel that when anesthesia has passed the five minute mark it is dangerous to continue. Possibly this is a tradition carried over from the days of pure nitrous oxide anesthesia. Gas oxygen anesthesia may be as prolonged as any other anesthesia with entirely no ill effects or complications. As a matter of fact if anything untoward is to happen it generally occurs during the first five minutes of induction. Once past this point anesthesia may be safely maintained until any oral operation is completed. The only effect of a long anesthesia is a tired feeling which disappears after a rest of fifteen or twenty minutes.

If a number of teeth are to be removed, I believe that in the average run of cases they should be removed at one sitting. No more than a general surgeon would consider removing one infected tonsil at a time, should the dental surgeon fear removing all infected teeth at one time. The only exceptions to this rule are cases in which the patient is suffering from some severe systemic disease or in the presence of acute infections. It is good practice to remove a tooth to establish drainage, but it is poor surgical judgment to remove other teeth at the same time.

In conclusion let us briefly consider emergency measures. If a patient suddenly plunges into deep anoxemia with all its alarming symptoms, what is the operator to do? The first and most important consideration is cool-headedness. Do not get excited and lose your head or you may lose your patient! Immediately stop all operative work and concentrate on reviving your patient. Spread the jaws apart and keep the air passages open by grasping the tongue with tongue forceps and pulling it forward. If these forceps are not handy, use your fingers but never allow the tongue to fall far back into the throat, for it completely occludes the glottis and breathing is impossible. Simultaneous with this procedure have your assistant turn on the emergency oxygen. I would suggest that an oxygen tank containing 10 per cent carbon dioxide be kept on the machine for such contingencies. I am in favor of 5 per cent carbon dioxide in all oxygen cylinders for every anesthesia, and have all my tanks of oxygen furnished in that proportion. Keep the oxygen flowing under pressure until the patient is revived. Many good operators include at this point a dilatation of the sphincter ani as an emergency measure. If the patient shows no sign of recovery after these elementary measures, you must resort to mechanical or chemical stimulation of the respiration. First try to initiate respiration by compressing the abdominal structures against the diaphragm. This pressure will drive the gases from the lungs. By releasing the pressure and raising the arms overhead inspiration may start. If respiration is still very weak or entirely absent after these tactics, lift the patient from the chair

and place him prone on the floor, face down. Straddle the patient and apply Schäfer's method of artificial respiration. I will not enter into the details of this method, since they can be found in any book of first aid. Continue artificial respiration until natural respiration begins. If the patient responds very slowly, try a hypodermic injection of one of the Mulford units (such as camphor in oil or strychnine sulphate) which are excellent respiratory stimulants. Burton-Opitz, a prominent physiologist, feels that while there is the slightest pulsation of the heart there is yet a possibility of life regardless of all other symptoms including the cessation of respiration.

DEFINITE LOCALIZATION OF SUPERNUMERARY TOOTH FOLLICLE IN THE MAXILLARY SINUS

BY DR. M. HILLEL FELDMAN, NEW YORK, N. Y.

IN THE accompanying roentgenograms opportunity is afforded to make a survey of the preoperative conditions involved in the surgery of an impacted unerupted maxillary molar. On Fig. 1 one is able to determine only the hidden



Fig. 1.



Fig. 2.

presence of the unerupted tooth. Its relative localization is not possibly determined here. In Fig. 3 one may see the tooth follicle actually within the

maxillary sinus. The position of the head is turned at a 45 degree angle on the sinus block. This throws off the maxillary sinus of the opposite side.

In Fig. 2, with the head in position for the direct postero-anterior view,



Fig. 3.

the tooth is shown well up in the head but still indeterminate as to its real position. Fig. 3 definitely localizes the tooth in the sinus of the right maxillary bone.

Operation verified roentgen findings. The tooth was found caught in a shelf of bone such as one frequently finds in the maxillary sinus.

DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

Edited By
Clarence O. Simpson, M.D., D.D.S., F.A.C.D.,
and Howard R. Raper, D.D.S., F.A.C.D.

THE DEVELOPMENT OF RADIOGRAPHIC FILMS BY INSPECTION

BY CLARENCE O. SIMPSON, M.D., D.D.S., ST. LOUIS, MO.

THERE is likely to be a tremendous difference in the results of applying abstract theories, in comparison with practical methods, to problems involving biologic factors. Scientific principles are valuable as a basis for calculation, but standardized procedure is not universally applicable to variable physical characteristics. Surgery, therapeutics, and dietetics must be modified to individual peculiarities, and even then the reactions are far from uniform. In no other branch of radiography are anatomic variations of such consequence as in intraoral examinations. Only slight modifications of technic are required for extraoral examinations, but careful calculation is necessary for each region to register accurate images of the teeth upon films placed in the mouth. These variable factors in the relation of the film packets and the position of the teeth preclude the standardization of projection angles.

In estimating the penetration and exposure for intraoral radiographs, a problem arises which is almost as difficult as that of angulation. The thickness of the tissues to be penetrated averages about $1\frac{1}{4}$ inches, and in general radiography is comparable only to the hand. Within this thin area are structures ranging in density from enamel, the most radiopaque tissue in the human body, to the dental pulp the most radiolucent. Two of these, the dentin and cortical bone, are of almost equal radiability. The thickness of the alveolar process can be predetermined, but the comparative radiability of the structures must be ascertained by tests. Since refined radiodontic interpretation is to distinguish any pathologic changes, from incipient decalcification of the enamel to slight rarefaction of the delicate trabeculae, the maximum differentiation of densities is required. Overexposure obscures bone detail, and underexposure fails to reveal the internal anatomy of the teeth and perhaps of the bone. If the alveolar bone of all subjects were of low radiability, the penetration and exposure could be gauged for the teeth in each region and would be quite uniform. This condition does not exist in most subjects, but instead the great difference in radiability creates an al-

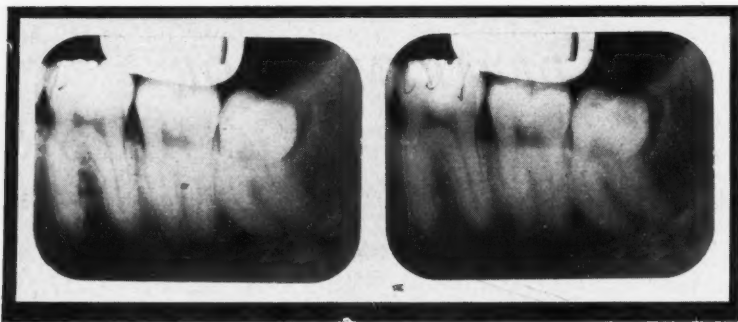
GROUP I. A TEST IN ESTIMATING EXPOSURE BY MEN WHO LIMIT THEIR PRACTICE TO
RADIODONTIA

Fig. 1.—The film on the left was developed according to the five-minute standard. The film on the right was developed six minutes to produce the desired density.

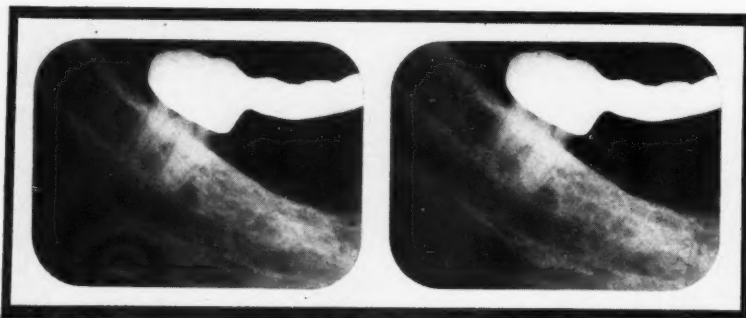


Fig. 2.—The exposure of these films was correct, and the desired density was produced by developing for five minutes.

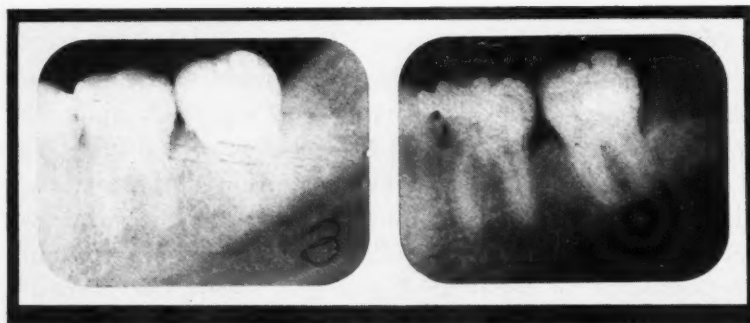


Fig. 3.—The film on the left was developed according to the five-minute standard. The film on the right was developed nine minutes to produce the desired density. Some chemical fog resulted from this prolonged development.



Fig. 4.—The film on the left was developed according to the five-minute standard. The film on the right was developed only four minutes to produce the desired density.

GROUP I. CONTINUED.



Fig. 5.—The film on the left was developed according to the five-minute standard. The film on the right was developed only four minutes to produce the desired density.



Fig. 6.—The film on the left was developed according to the five-minute standard. The film on the right was developed only four minutes to produce the desired density.



Fig. 7.—The film on the left was developed according to the five-minute standard. The film on the right was developed six minutes to produce the desired density.

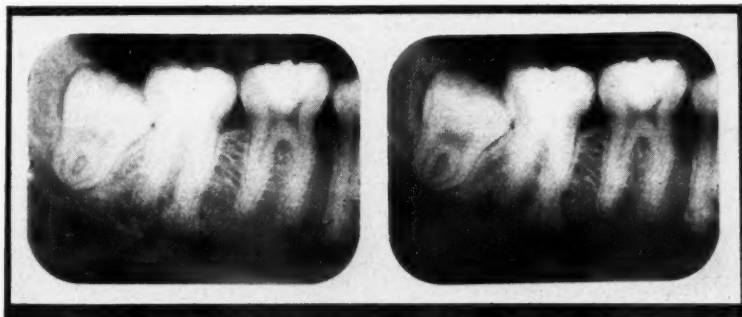


Fig. 8.—The film on the left was developed according to the five-minute standard. The film on the right was developed six minutes to produce the desired density.

luring contest in attempting to estimate the correct exposure. The size of the individual is not significant; therefore, the exposure instructions accompanying x-ray apparatus which classify patients as large, medium, and small are as erroneous as that for angles. The amount of flesh on the jaws is of less consequence than the thickness of the process, but the structure of the bone is more influential than the other factors combined. Some of the subjects who require the most penetration and exposure weigh about 100 pounds, so size and weight do not determine the radiability. This statement is emphasized by the experiences of the day this is written. The average exposure and penetration was ample for a man six feet and four inches in height, weighing 240 pounds, who surely would be classed as large. A woman who preceded him weighed about 120 pounds and required a 25 per cent increase over the average exposure and penetration to register the bone detail.

The manufacturers of x-ray equipment and films and the dealers who sell them "pass the buck" to the purchaser. They state that anyone can learn to operate the machine in a few minutes, and they create the impression that no additional knowledge is needed to practice radiodontia. They sell developing tanks as an essential, and glorified alarm clocks as accessories and instruct the purchasers to develop all films five minutes at 65 degrees Fahrenheit. This is featured as a standardized method, and operators are told that the exposures must be regulated to produce radiographs of the desired density. If the "standard bearers" offered a feasible plan for gauging the correct exposure for each patient, their statements would be more convincing. The next time a salesman or detail man who has only a speaking acquaintance with radiodontia tells you that all films should be developed the same length of time, ask him to make three exposures of different persons and, if he consents to the test, observe his results with the method.

The development of radiographic films for five minutes at 65 degrees Fahrenheit is an arbitrary standard based on the fact that it approximates the complete development of the emulsion. With proportional exposure radiographs developed four, five, and six minutes do not noticeably differ, so the standard might as well be four or six minutes. Exposures which produce radiographs of the desired density in five minutes with fresh developer are insufficient to duplicate the result in moderately exhausted developer which is commonly used in the tank method. Consequently the exposure scale would have to be adjusted to the vigor of the developer. Time development of radiodontic films is an attractive theory but impractical in application. Some subjects require 50 per cent more exposure than others, and some regions 100 per cent more than others. Furthermore, the ratio of exposure for different regions is not constant in all subjects. With these incalculable variations to be considered, correct exposure is obtained only by repeated tests or accident.

The statement that radiodontic exposures cannot be estimated with precision might not be impressive without evidence to prove it. To secure the evidence, the following request was sent to men who limit their practice to radiodontia.

GROUP II. A TEST IN ESTIMATING EXPOSURE BY DENTISTS WHO HAVE USED RADIOGRAPHIC EQUIPMENT FOR MORE THAN FIVE YEARS



Fig. 9.—The film on the left was developed according to the five-minute standard. The film on the right was developed only two-and-one-half minutes to produce the desired density.



Fig. 10.—The film on the left was developed according to the five-minute standard. The film on the right was developed only four minutes to produce the desired density.

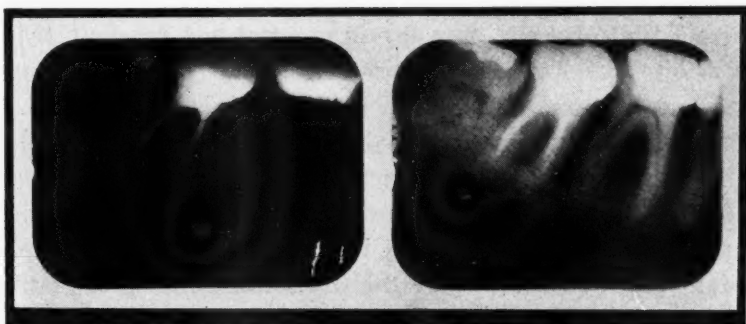


Fig. 11.—The film on the left was developed according to the five-minute standard. The film on the right was developed only two minutes to produce the desired density.

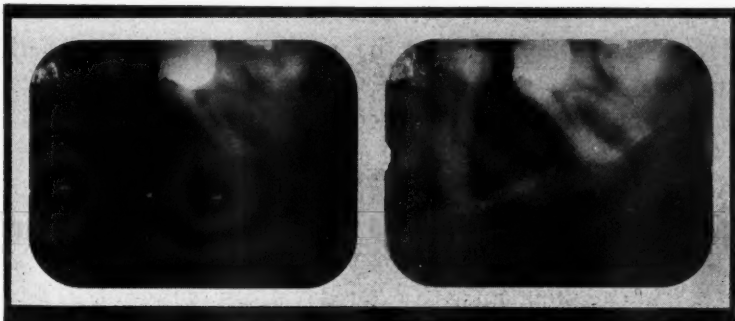


Fig. 12.—The film on the left was developed according to the five-minute standard. The film on the right was developed only three minutes to produce the desired density.

"In a test which I am making of the comparative advantages of time and temperature development, and development by inspection, I request your cooperation in the following details. Without knowing the radiability of the subject, please radiograph a lower molar region on the enclosed regular slow films with the correct exposure as you estimate it; and return the undeveloped films to me. To obtain the full benefit from the experiment, you should not make previous tests of the exposure required."

One film from each packet was developed for five minutes at 65 degrees Fahrenheit, and the other was developed to the desired density with a notation of the time. The result of the eight tests shows only one correct exposure. One is hopelessly underexposed, and the other five err 20 per cent either in underexposure or overexposure.

If men practicing radiodontia exclusively cannot precisely estimate exposure, it is unlikely that dentists who do only a small amount of radiography can even approximate correct exposures. However, this opinion is valueless without some proof to support it. To obtain this proof, four dentists who have had radiographic equipment for more than five years were asked to make a carefully estimated exposure. All of these men use slow films, so it was unnecessary for them to change their usual exposure technic. The second group of illustrations shows the result of this test. With the standard development of five minutes at 65 degrees Fahrenheit, the errors in exposure range from 20 per cent to 60 per cent. This is the developing method recommended by everyone using dental films, but three out of four exceptionally intelligent and capable dentists with more than five years' experience in radiography were unable to produce suitable radiographs by the method. It is not surprising that oral radiography in general is a farcical pretense, when it is impractical to develop films by time as advised by manufacturers, salesmen, and authors of textbooks. Obviously, there is less sales resistance encountered and less instruction required by recommending time development, but it is an injustice to dependent practitioners.

Assuming that the purpose of development is to disclose the maximum amount of information from the latent image in the emulsion, the time should be regulated to produce the proper density. An earnest attempt should always be made to estimate correctly the exposure; but when errors occur, there is no reason for sacrificing the results to a foolish system. The logical solution of the problem is to give ample exposure based on a careful estimate and to develop by inspection. There is an element of safety in a tendency to overexposure, because more can be accomplished in correcting it than underexposure.

Anyone with moderate shade perception can easily learn to develop by inspection. The first requisite is a red safe light directed downward so it will not shine in the eyes. A green safe light is permissible on the ceiling to illuminate the dark room, but it is unsuitable for judging the shade of films. A tray or dish may be used instead of a tank, as separate clips are attached to each film. The smaller quantity of developer offers the advantages of regulating the temperature quickly, and renewing the supply frequently. Individual clips do not materially prolong the process, as most of the time is

consumed in opening the packets and placing the films in the clips. With separate clips each pair of films can be put in the developer before the next packet is opened, so the total time is only slightly longer than when multiple holders are used in a tank.

In learning to develop by inspection, a pair of films should be developed by time and inspected under the red light at three, four, and five minutes in an attempt to judge the degree of development. After these films have cleared in the fixing solution, they should be examined by the customary illumination to observe the density. If they are of the proper density, their appearance under the red light after five minutes in the developer is a criterion for future comparison. If they are too dark, their appearance at three or four minutes is the basis for comparison. If they are too light, their appearance after five minutes' development is a shade which must be deepened for the proper density. With this knowledge as a guide, another pair of films is developed for three minutes and then examined about every thirty seconds. One of these films should be developed for five minutes, and the other until it appears to be the desired shade, whether it has developed for three minutes or seven minutes. After this trial has been repeated several times, the shade can be distinguished sufficiently well to utilize the method.

The inspection of the films under the red light should be for only about three seconds, to avoid streaks from the developer as it flows down the emulsion and raises in temperature. Films with the emulsion on one side should be viewed with the emulsion down, and double-coated films should be viewed on both sides. The shade cannot be determined by looking through the film toward the red light, but they should be held about 6 inches under the light while looking down at them. Caution is necessary in judging excessively exposed films as they do not have quite the density that their shade indicates. There is little to be gained in developing beyond seven minutes in fresh developer at 65 degrees, as the chemical fog obscures the detail. Constantly endeavor to estimate the required exposure, and maintain the temperature of the developer at 65 degrees, but when necessary modify the development to secure radiographs of uniform density.

ABSTRACT OF CURRENT LITERATURE

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA
DENTAL RADIOGRAPHY

BY DR. EDWARD PREBLE, New York City

NUTRITION AND PEDIATRICS

BY SAMUEL ADAMS COHEN, M.D., NEW YORK CITY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Nutrition and Pediatrics

Rheumatic Fever: Clinical Manifestations, Etiology and Treatment. David Riesman and James Craig Small. *Ann. Int. Med.*, ii, 7, January, 1929.

In a concise but fairly complete review of the current literature of rheumatic fever these authors discuss the disease under three aspects, (I) clinical manifestations (II) etiology (III) treatment.

Although a total of eighty different pathologic conditions under the term rheumatism has been described, the authors limit their pathologic conditions to ten, including definite manifestations of rheumatic fever of the joints, heart, pharynx, tonsils, skin, brain, pleura and lungs.

In reality this disease is often subacute, and even chronic rather than acute. They believe that the cardiac involvement of rheumatic fever is part and parcel of the rheumatic process rather than a complication.

Rheumatic infections are on the decline in all parts of the world. Heredity is not an important factor in this disease, which occurs much more frequently in children of poorer homes than in the richer homes. Contagion plays a rôle in its spread. Grenet in 1927 reported five distinct epidemics of rheumatic fever.

There are two particular types of lesion found in rheumatic fever, a proliferative and an exudative type. The exudative type manifests itself by outpouring of serum into the joints and periarticular tissues, pericardium and pleura, while the so-called Aschoff bodies typify the proliferative lesion of rheumatic fever.

Small in January, 1927, reported that an organism *Streptococcus cardioarthritidis* was isolated from blood of a typical case of rheumatic fever. This organism is most readily obtained from the throats of those individuals passing through an acute stage of the infection. Strains of this streptococcus constitute the first compact serologic group found definitely associated with rheumatic fever.

For the past eighteen months an antiserum prepared by immunizing horses and cattle with the *Streptococcus cardioarthritidis* has been used in the treat-

ment of 270 patients in Philadelphia General Hospital. Definite alleviation of joint symptoms and decline in temperature have followed the administration of from 5 to 15 c.c. of this serum.

In general, passive immunity conferred by an antiserum is of short duration, while active immunity is of a more lasting character and is much more efficacious in the prophylactic treatment of rheumatic fever. For this reason, Riesman and Small believe that relapses following serotherapy can be greatly reduced by the use of repeated injections of small amount of vaccine or of the soluble products of *Streptococcus cardioarthritidis*. They state "that this combination constitutes an effective prophylactic therapeutic procedure in the rheumatic diseases."

The Epidemiology of Rheumatic Fever. M. J. Rosenau. Tr. A. Am. Physicians, cxviii, 787, May, 1928.

Rosenau quotes his colleague Atwater, who states that at present there is no general agreement as to the causal agent, the mode of transmission or the means of prevention of acute rheumatic fever. Atwater also found that in the United States during the past twenty-five years there is a striking decline in the number of deaths from rheumatic fever, and probably in the number of cases as well. However, there is a significant excess in the rheumatic death rate among colored persons, and this excess is also noted in those states where the disease is not prevalent.

Judging from the nature and variations of rheumatic fever, Rosenau feels that all the available evidence confirms the modern thought that rheumatic fever belongs with the communicable diseases.

The Geographical and Climatic Distribution of Rheumatic Fever. J. Tertius Clarke. M. J. & Rec., cxxviii, 7, Nov. 7, 1928.

The environmental conditions of rheumatic fever are the same as those of the rat and its flea, and the writer offers evidence to support the theory that the common brown rat and its fleas, *ceratophyllus fasciatus*, are responsible for the prevalence of rheumatic fever. For example, in the tropics where the environment is not suitable for this flea, neither rheumatic fever nor chorea occurs. Again in the United States and Canada there is a remarkable parallelism between the distribution of rheumatic fever and the distribution of the rat flea.

Poorer people have a much higher incidence of rheumatic fever, and they are usually in houses harbouring rats which are attracted there because of defective sanitation. Likewise this may account for the low incidence of juvenile rheumatism in Holland, because there anthracite stoves are commonly used, and these produce heat and dryness, both of which are inimical to the flea especially in the larval stage. In other words, those differences of temperature and environment which seem to be decided factors in the occurrence and nonoccurrence of rheumatic fever exercise a great influence on the life of the flea, *ceratophyllus fasciatus*. In brief, rheumatic fever does not seem to be present in territories where the flea cannot thrive.

Observations in Certain Etiological Factors in Rheumatism. Lucy Porter Sutton. *Am. Heart J.*, iv, 2, December, 1928.

Rheumatism in this paper refers to chorea and acute rheumatic fever. The data of 500 histories of 2000 cardiac cases seen at the Children's Service at Bellevue Hospital, and also at the Huddleston Memorial Cardiac Class, are reviewed. These cases were considered from four viewpoints, namely, race, sex, age at onset of rheumatism, and seasonal incidence.

The author's figures indicate that the Italians, Irish and native born Americans are more susceptible to rheumatism than, for example, are Spanish, Armenians and Jews. Females are slightly more prone to rheumatism and also to cardiac involvements. Moreover, the age incidence for the beginning of symptoms of rheumatism for boys is seven years, for girls nine years. In New York City the months of April and May show the highest incidence of this infection, and no co-relation could be made between meteorologic conditions and the monthly incidence of rheumatism.

Statistical Studies Bearing on Problems in the Classification of Heart Disease.

May G. Wilson, Claire Lingg. Geneva Croxford. *Am. Heart J.*, iv, 2, December, 1928.

The authors review the literature on the value of tonsillectomy in the prevention of the occurrence and recurrence of manifestations of the rheumatic syndrome, and claim that the evidence as presented is inconclusive. They analyze their own records of 413 rheumatic children who were followed from one to ten years. Of these, 247 have had their tonsils removed; the remaining 166 children served as controls.

Wilson and her associates are of the opinion that the significant factor in the recurrence of rheumatic infection is the age at which tonsillectomy is performed and not the actual removal of the tonsils themselves. That is to say, both groups, the control and those children who have had their tonsils removed, have practically the same incidence of recurrence of rheumatic infection. The incidence of the manifestations of infection in both groups begins in children at the age of two years and increases with each succeeding year until the age of eight, and then gradually but progressively declines. After the age of nine the susceptibility to infection appears to be lessened regardless whether the tonsils are removed or not.

As a result of their careful study they conclude that "the routine removal of tonsils for the prevention of rheumatic heart disease is not based on conclusive data."

The Rôle of Infection in Rheumatic Children. Hugh McCulloch and Edith I. M. Irvine-Jones. *Am. J. Dis. Child.*, xxxvii, 2, February, 1929.

These authors report a study of 150 members of the Children and Heart Clinic of Washington University, St. Louis. The study was undertaken in order to find out how far the routine supervision of rheumatic children in hospitals and clinics affects the tendency to recurrence of rheumatic manifestations.

The age incidence in the first attacks of rheumatic fever agrees with the

observations of other writers in that the maximum of first attacks occurs between the ages of ten and twelve years. From the age of three years the tendency to rheumatic fever begins, and after twelve years there is noted a sharp decline.

Their experience with the seasonal incidence of rheumatic fever agrees with the general impression of others in this country, in that the disease is most common in spring when the nature of the weather is such as to predispose to infection of the upper respiratory tract.

In 95 of their 150 cases infections of the upper respiratory tract were extremely frequent, and these writers feel that there is a marked susceptibility of rheumatic children to respiratory infections between attacks of rheumatic fever.

In regard to the time-worn discussion as to the effect of tonsillectomy on the recurrence of rheumatic fever, McCulloch and Irvine-Jones believe that tonsillectomy is one of the important measures in the care of rheumatic children. They feel that other observers would have more favorable results after tonsillectomy if they would take care of other foci of infection in the same individual.

One group of rheumatic children was cared for at a convalescent home, and it was noted that a recurrence of rheumatic fever was extremely rare there. In the control group, or those who were cared for at home, the recurrence of rheumatic fever was comparatively common. But when the children after their sojourn at the convalescent home returned to their own homes, the results were particularly interesting. Now their incidence of recurrence greatly exceeded those control children who did not have the opportunity of institutional care.

The explanation offered by the authors for these facts is that those children who were kept free from infection of the upper respiratory tract during their stay at the convalescent home, were probably more susceptible to such infections with the attendant rheumatic manifestations on their return to their usual life.

Although the writers feel that dental infection plays a minor rôle in the occurrence of rheumatic fever, nevertheless, it is their policy to secure adequate dental care for these children.

The authors think that there is enough evidence at present to lead them to believe that the ordinary infections of the upper respiratory tract, including tonsillitis and the common nasopharyngitis, are responsible for the initial attack and subsequent recurrence of rheumatism. They further believe that only by careful observation and prolonged treatment of all diseases in the nasopharynx will prophylactic treatment of rheumatic fever be effective.

The Bacterial Factor in the Rheumatic Infection in Childhood. Carey F. Coombs. *M. J. & Rec.*, lxxviii, 9, Nov. 7, 1928.

In a paper read at a conference at Bath, England, May 10, 1928, on rheumatic fever, this authority states that two-thirds of the victims of rheumatic fever come from the ranks of children of public elementary schools. This in-

fection is due to invasion of the brain, joints, heart and subcutaneous tissues by streptococci which are borne there by the blood stream. He further states that many workers have been able to find various strains of streptococcus in the blood stream and, in addition, were able to cultivate them.

Regarding the entrance of the systemic circulation, the author feels that we may accept the view that the entrance is certainly through the tonsil, and possibly also through the intestinal mucosa. Coombs suggests that the organisms tend to persist in the tissues which they have infected. There they lie dormant for long periods and are re-awakened from time to time.

The Child With Potential Heart Disease. C. G. Kerley. J. A. M. A., xcii, 7, Feb. 16, 1929.

Kerley points out the fact that although much has been done in the way of clinics and associations for the study of heart disease in children, practically no progress has been made in its alleviation or cure in the past forty years.

There are some children who seem more susceptible to the microorganism causing rheumatic endocarditis than others. In these children it is imperative to treat focal infections such as tonsils, teeth and sinusitis. According to the author, children who complain of muscle pain or stiffness, or joint pains, or tired legs, particularly on damp days, stand out preeminently as potentially having heart disease. In such cases the tonsils should be removed regardless of their appearance. In addition to eradication of possible foci of infection, the writer gives these predisposed patients salicylic acid in some form for about ten days during the month.

Rheumatic Heart Disease in Childhood. F. John Poynton. Lancet, ccxv, 5481, Sept. 15, 22, 29, 1928.

In three Lettsonian lectures delivered before the Medical Society of London, Poynton expounds some of his views on rheumatic heart disease in childhood. This noted authority and investigator is a firm believer in the hereditary factor in the susceptibility of acute rheumatism. He feels that there is some peculiarity of constitution transmitted which makes certain children less resistant to rheumatic infections.

Poynton is in accord with many others when he states that chorea is the most frequent solitary manifestation of rheumatism. He holds that a lowered nerve tone is an important predisposing cause and that any injury to the nervous system, such as a continual strain from excessive or prolonged brain work without sufficient rest, is apt to bring on an attack. It is interesting to know that rheumatic children between the attacks of acute rheumatism suffer from prostrating headaches or paroxysmal attacks of cyanosis of a limb or spasms of the muscles or intense neuralgic pains.

From his thirty years' observation and from his statistics based on 1000 first attacks, Poynton states that the highest incidence of rheumatic heart disease is around the tenth year of life. He feels also that there are many more cases of rheumatic fever occurring in children under five than is generally recognized.

The mode of onset of rheumatic heart disease varies. Most cases begin with sore throat, arthritis, and muscular pains, or with chorea. However, there is a small group of cases of rheumatic heart disease which are preceded by fever, loss of weight and strength, anemia, shortness of breath, nervousness, irritability or other evidences of poor health.

The author states that there are many different views regarding the predisposing causes of acute rheumatism. He holds, however, that the infection is particularly likely to follow when a spell of dry, warm weather changes to cold winds and wet, damp weather. It is the sudden atmospheric change which is the important factor, rather than any specific kind of weather.

What rôle do the tonsils play in the causation of rheumatic heart disease in children? Poynton thinks that the balance of evidence is "in favor of the opinion that the removal of unhealthy tonsils by enucleation tends to diminish the severity of further attacks, even if it does not prevent them." Poynton further adds that "once infection has taken place, we are not yet in a position to say when it has been destroyed in the tissues of the body or where it may be hiding."

Although he feels that more investigation on this point is necessary, this authority is not impressed with the origin of acute rheumatism from dental disease in childhood.

In regard to medical treatment, Poynton has recently abandoned the use of salicylates in the most severe forms of carditis in childhood; he is of the opinion that it is a *dangerous drug when given in large doses to fragile rheumatic children*. In its place he now uses tolysin which is less toxic than the salicylates.

Regarding convalescence from rheumatic cardiac disease, the writer quotes the statistics of the Heart Home at Kurandar. He comments on the fact that although the children do well at the institution, many of them have relapses when they return home. Here, he states, is a problem worthy of study. He feels that this problem, along with many other problems concerned with the supervision, care and control of children having rheumatic heart disease, can best be solved by having large institutions constructed for that purpose. He hopes that these will soon be established.

Pleural and Pulmonary Lesion in Rheumatic Fever. John R. Paul. Medicine, vii, 4, December, 1928.

The best of the earliest descriptions of rheumatic fever was that of Sydenham published in 1676. To Ballonius, a Parisian physician, however, is attributed the first use of the term rheumatism in 1636. The close relation of rheumatism to cardiac lesion was repeatedly observed throughout the eighteenth century, and in 1787 David Pitcairn of London is credited with being the first to report the presence of heart disease following acute rheumatism.

A Viennese physician, Maximillian Stoll (1742-1787), is said to be the first to speak of rheumatic pleurisy and rheumatic peripneumonia, but it is due to the French school in the beginning of the eighteenth century that our early conception of rheumatic pleural lesions is founded. Since that time repeated

mention has been made of the fact that rheumatic fever is a disease of the serous membranes essentially involving the synovial membranes of the pericardium and the pleura.

Today it is accepted that rheumatic fever is a generalized process of which the joint and cardiac lesions are merely local manifestations. In addition it is generally recognized that next to cardiac involvement, pleurisy is the most common lesion found in patients with rheumatic fever. As in the case of carditis, pleurisy may rightfully be regarded as another manifestation of rheumatic disease rather than as a complication. Due to the difficulties in labeling a given pleurisy as being rheumatic in origin, there are bound to be discrepancies among the clinical statistics on its incidence. The figures range from 2.4 per cent to 15 per cent; in 1927 Swift wrote that the incidence of pleurisy in rheumatic fever is from 5 to 10 per cent. According to Swift rheumatic pleurisy indicates a severe rheumatic infection, and an accumulation of fluid in the pleural cavity is almost constantly associated with it. The factors which contribute to this accumulation of fluid in the pleural cavity are multiple, and consequently the character of the fluid may present very wide differences. The author mentions that in young children on several occasions there was a hemorrhage effusion in the pleura as well as in the pericardial cavities.

Regarding the lung proper it is difficult to typify any gross lesion caused by the rheumatic organism, for practically any or all of the common lung lesions may occur. From necropsy material and in a series of 30 cases there were evidences of focal hemorrhagic lesions which were rather widespread. In children particularly, there is, in addition, a lobular pneumonia having certain atypical features which differentiate it from the usual type of secondary pneumonia. Moreover, because of the almost constant evidence of circulatory stasis in the lungs there was for practical purposes a constant finding of bronchitis and bronchiolitis.

The author feels that the pleural and pulmonary lesions in rheumatic fever are probably more common and perhaps more significant than we have been hitherto led to believe.

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EDITORIALS

The New Arizona Dental Law

WE HAVE before us Senate bill No. 8 which we understand is a copy of a law enacted by the legislature of the State of Arizona. The purpose of this law is to regulate the practice of dentistry and orthodontia. We understand that the law was sponsored by a member of the profession who is affiliated with a group on the Pacific coast which seems to be desirous of separating orthodontia from dentistry, thus classing orthodontia with osteopathy, chiropractics and other pseudoscientific medical cults.

It has always been our belief that a practitioner of orthodontia should be better educated, if possible, than those who are engaged in the general practice of dentistry. In fact, we believe that all specialists in medicine and dentistry should be men who have the fundamentals of the profession and then the additional training in their specialties.

In reading the law, we find a proposition made whereby "The Board of Dental Examiners and two practicing Orthodontists, appointed by the gov-

ernor, shall constitute the Examining Board of Orthodontia; which joint board shall have and exercise all powers of supervision and licensing of orthodontists as the Board of Dental Examiners have with respect to dentists." We also find the bill provides that "A person desiring to practice orthodontia in the state shall file a verified statement of his qualifications with, and make application to, the board in form as by it prescribed, for an examination, and pay a fee of twenty-five dollars, which shall not be refunded if the applicant is eligible for examination. An applicant failing to qualify on his first examination shall be entitled to one additional examination by the board without fee. Such applicant shall furnish satisfactory proof of having been in residence at a college or university and having there completed courses in each of the following subjects:

"Chemistry, 10 units, Zoology, 8 units, Physics, 8 units, English, 12 units, and Mechanical Drawing, 2 units."

"Such applicant shall present satisfactory proof of having graduated from a legally chartered school, college or university approved by the Board of Dental Examiners of Arizona, offering or maintaining a course of instruction in orthodontia covering at least thirty-four hundred (3400) hours and including the following minimum requirements:

Group 1.—Anatomy, Histology and Embryology—10 to 15 per cent.

Group 2.—Dental Anatomy and Comparative Anatomy—6 to 8 per cent.

Group 3.—Physiology—3 to 4 per cent.

Group 4.—Dental Pathology and Rhinology—3 to 4 per cent.

Group 5.—Dental Science and Metallurgy—3 to 4 per cent.

Group 6.—Art, Roentgenology and Photography—1 to 2 per cent.

Group 7.—Orthodontia—53 to 63 per cent.

Total number of hours required, 3400 hours."

The preliminary educational requirement, before a student takes up the study of orthodontia in a recognized school, college or university approved by the Board of Examiners of Arizona, may be considered a predental course.

The ridiculousness of the proposed law is that they have provided for separating orthodontia from dentistry, and allowing men to practice orthodontia who have not been trained in the basic science of dentistry. They have included only a small part of that which is taught in dental schools, with the exception that a greater number of hours are to be devoted to orthodontia. If the bill had required only men who were licensed to practice dentistry to specialize in orthodontia, there would have been some sense and logic to it.

As the law is now written, orthodontists will simply occupy the same relation to dentistry as midwives occupy to medicine. The orthodontist's education compared to that of the general dentist will be about the same as the education of the osteopath compared to that of the doctor of medicine.

For a number of years a great many men who have been practicing dentistry and orthodontia have been endeavoring to raise the standards of both professions. We think the majority of educators believe that an individual who is going to specialize in any branch of dentistry should first be educated in the fundamental principles of dentistry and possess a D.D.S. degree.

The proposed bill requires an orthodontist to have about as much training as a dental hygienist, and much less training than is proposed in a recent bill introduced in the New York legislature for the education of dental mechanics.

The law requires that an individual desiring to practice orthodontia or even to qualify for the examination which would permit him to practice, must follow a certain prescribed course of study and devote a definite number of hours in a school, college or university approved by the Board of Dental Examiners of Arizona. In other words, the Board does not intend to allow anyone to take the examination regardless of his qualifications unless he has adhered to the prescribed course of study. We think this a ridiculous requirement which has already been applied to too many professions. It seems to us that the duty of a Board of Examiners should be to examine the fitness of an individual regardless of when, where and how he has obtained the knowledge necessary to pass the examination.

There are a great many men practicing dentistry and orthodontia today, and there will be a great many in the future who will never have followed this course of study and who will undoubtedly be able to pass the examination and occupy a more prominent position in the orthodontic profession than the majority of the men who will be on the Board of Orthodontic Examiners. We pause to ask, Who is going to examine the Board of Orthodontic Examiners in order to know whether they qualify to hold their positions? The only stamp of approval they have is that they are appointed by the governor, and we have known governors to make poor appointments.

The bill provides that any dentist licensed by the Board of Dental Examiners of Arizona prior to the passage of this act shall be eligible to practice orthodontia without complying with the new provisions, relating to orthodontia, provided that such licensed dentists register with the State Board of Orthodontia Examiners as a licensed orthodontist prior to July 1, 1934.

One effect of this bill will be to prevent any dentist who is not licensed in Arizona prior to the passage of this act and who does not meet the schedule of study outlined in this act from obtaining a license to practice in Arizona. We do not believe there will be a great rush of dentists to Arizona, yet we think such a law is contrary to American principles because it is going to prevent the people of Arizona from obtaining service in the future from competent men who cannot comply with the law. However, this is a matter which affects only the state of Arizona.

The real evil of this bill is that it lowers the orthodontic standard for it allows "half-baked," half-educated individuals who are not trained in the basic principles of dentistry to take up the practice of orthodontia and force this lack of knowledge on the public. Instead of dignifying the profession of orthodontia, this bill makes a pseudoscientific cult out of it which no self-respecting dentist will desire to practice.

ORTHODONTIC NEWS AND NOTES

All Aboard for the American Society of Orthodontists Meeting, Estes Park, Colorado, July 15 to 20, 1929

By Albert H. Ketcham

On Tuesday morning, May 21, the good wife and I settled into the cushions of the old auto and turned north toward Estes Park. When once out on the main highway leading to the wide open spaces I stepped on the gas. As we glided along between meadows and grain fields, Mrs. Ketcham was busy calling attention to the sunlight playing upon the snow-capped peaks of the Continental Divide to our left, or to song birds, pheasants and flowers along the road.

We passed through the beautiful and prosperous towns of Longmont, Berthoud, and then into charming Loveland. Leaving Loveland, we turned west toward the mountains, passing between orchards of apples, cherries and pears, all in full bloom and presenting a beautiful sight. Then on up the winding road until we reached the falls at the mouth of the Big Thompson River Canyon. Here we reduced our pace somewhat and followed the wide highway between towering granite walls. It was a wonderful sight, and we wished as we glanced at the pools between the roaring rapids that we could stop and cast a fly for some of the lusty trout which we knew were in the depths of the stream. Occasionally we would catch the gleam of the silver sides of a trout dashing up the rapids.

After twenty-one miles of wonderful canyon scenery, we came into the wide, open valley of the Big Thompson River in Estes Park, and soon passed through the village of Estes Park and on up the hill overlooking the village to the Craggs Hotel. Here we found that Dr. and Mrs. Henry Hoffman had preceded us, as they had taken the shorter route over the North Saint Vrain River Road, reporting a wonderful trip, and we also had a most enjoyable eighty-six mile drive from Denver.

After spending a busy hour and a quarter with Mr. Joe Mills and Mr. Davis, manager at the Craggs, we all had lunch at the Stanley with the manager, Mr. A. D. Lewis, who is also manager of the Lewiston Hotel. After transacting business with the Stanley, Elkhorn and Lewiston Hotels until 5 o'clock, Dr. and Mrs. Hoffman were obliged to start home.

After dinner the evening slipped away rapidly in conversation with Mr. Lewis, laying plans for the success of our meeting. We found that Mr. Lewis of the Stanley and the Lewiston, Mr. Mills and Mr. Davis of the Craggs, and also Mrs. Hondius and her secretary of the Elkhorn Hotel, are all endeavoring to make the visit of our members a most enjoyable one, so that when they depart it will be with a resolve to return for a longer stay.

On Wednesday Mrs. Ketcham and I spent a busy forenoon and part of the afternoon. It was a bright, warm day which we enjoyed immensely. The early sand lilies were in bloom, also a cactus was putting out very beautiful blossoms which looked much like asters.

At 3:30 o'clock we bade adieu to Mr. Lewis and started for the South Saint Vrain River Road. About two miles beyond Estes Park Village we saw eight deer near a group of summer cottages. They seemed to be enjoying a change from winter diet to the green shoots which the bright sunshine and warm weather were bringing out.

At the Estes Park Chalets we stopped for a visit with the manager and are greatly pleased that we have been able to secure fifty rooms with baths in these fine lodges, for the reason that the Stanley, Lewiston, Craggs and Elkhorn Hotels have sold all their too few

single rooms. The Chalets can meet the demand for rooms with bath for one person at \$8.00 per day, American plan, or a room for two with bath at \$14.00 per day. The manager cannot promise us any number of rooms with baths for the first night. However, the Chalets will provide rooms having hot and cold water with bath near by for the first night, and rooms with bath from Tuesday on, and it is possible that they may be able to furnish several for Monday night.

If you have not already done so, you are urged to send for your hotel reservations at once to Dr. Fred W. Beesley, Republic Building, Denver, stating kind of room desired and of adults and children in your party. The reason for this is that we wish to plan for your comfort and pleasure while you are in Colorado and, if necessary, to employ playground instructors to see that the children are cared for while the mothers are on trips, etc. All rooms with baths are sold at the Craggs and the Elkhorn Hotels, but there are a number



left at the Stanley and Lewiston Hotels. All four hotels have a number of double rooms left with bath on same floor. In the case of a room in a cottage there is a cottage near by devoted to shower baths and toilets. Counting rooms without baths and five hotels will be able to care not only for their regular guests but also for all attending our meeting, even though we should have one hundred more in attendance than usual. The meals in all the hotels are excellent and are served to all guests alike whether they occupy rooms the price of which is only a dollar or two a day above the price of the meals, or whether they are occupying the most expensive rooms. The only objection we find is that the meals are too appetizing and too bountiful, inducing one to overeat.

The nights in Estes Park are cool even in July and August, and the pure, soothing air induces restful sleep. Usually the newcomer to the mountain altitudes feels sleepy, relaxed, with the nerves let down, and in splendid condition for building up a reserve for the work of the winter. So we feel quite confident the members of our Owl's Club will become drowsy long before midnight and retire to peaceful, restful slumber. Many will make a

resolve to arise early to view the sunrise on the snowy range or to have a round of golf, but with the strong arms of Morpheus about them, they will feel loath to answer an early call. However, there will be a sergeant-at-arms at each hotel whose duty will be to see that members arise not later than 7 o'clock. The hotel managers are arranging to have breakfast served promptly for our members. The busses will call for those who are not registered at the Stanley and deliver them at the meeting auditorium before 9 o'clock. Lunches for all those in attendance at the meeting will be served at the Stanley without extra expense to the guests of the other hotels. The ladies will be entertained at a different hotel each noon for lunch, excepting on the second day there will be a picnic for the ladies and the children.

It is planned to have representatives of our local society, including ladies, at each of the five hotels. Our Local Arrangements Committee is working energetically under the able leadership of Dr. Hoffman. Dr. Beesley is handling the difficult problem of pleasing everyone with the desired hotel reservations in a most able manner. Charlie Baker says the great majority of the fellows are good sports and will enjoy the novel experience of holding a meeting under the spell of the Rockies.

It was also an enjoyable trip home down the South Saint Vrain Canyon Road. We wished time and again while passing through the canyons that we were in one of the Rocky Mountain Parks Transportation Company's busses, with the top down, so that we might fully enjoy the grandeur of the topmost pinnacle of the cliffs and their pine-crowned summits.

It does look as though we are to have a splendid meeting. Bill Flesher, Paul Spencer, and Leuman Waugh have worked extremely hard upon the program, and now Charlie Baker is struggling with the printers; but don't waste your sympathy, these fellows are gluttons for punishment when it comes to hard work! Besides they have learned how to organize their work upon an efficient basis. I believe that you all admit after reading the outline of the program in the May issue of the *INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY, AND RADIOGRAPHY* that it points to a thorough, scientific treatment of several important subjects.

First let me mention muscle exercise, that great aid in treatment when correctly applied, presented in symposium form by Drs. Alfred Rogers and Homer B. Robinson, with well-qualified men opening the discussion. We all have wished for a more thorough understanding, now is our opportunity.

Then the symposium on nutrition. Why are so many children undernourished, and what has medical science learned in regard to securing an improvement in treating this condition? May we hope in cases of retarded development to be able to produce through correct diet, sunlight, cod liver oil, or by other means, a period of accelerated growth, thus enabling the orthodontist to correct a larger percentage of stubborn cases. Drs. Marriott, Key, and Marshall have a message which will give us a better conception of the solution of this problem.

Dr. Harvey Stallard in a recent letter said: "I note with pleasure that you are to have McKim Marriott, 'Symposium on Nutrition,' on the program. We had him here for a week's lecture in connection with the San Diego Academy of Medicine. He's a treat."

Another subject which many wish to have explained in an analytic manner is the Simon method of diagnosis. Is it more accurate than our older methods founded upon judgment gained through years of experience, or lacking experience, diagnosis by "hunch"? This method of diagnosis will be discussed in the form of a symposium by the men who above all others are best fitted; namely, Drs. Lischer, Suggett and Hawley, with Drs. McCoy, Kelsey, Dewey and Hellman opening the discussion.

Another subject of great importance to the orthodontist is the development of the maxillary sinuses. How many can tell the size of the maxillary sinuses at birth? How many can tell how early in the infant's life infection of the sinuses may occur, and what effect have infections upon the development of the sinuses? Dr. W. Walter Wasson of Denver, the founder of the Children's Research Council of the University of Colorado, School of Medicine, can answer these questions and can show us through roentgenograms what

actually occurs. For years Dr. Wasson has been studying the growth of the sinuses, as well as the growth of the entire body of the child, by x-raying the infant shortly after birth, then repeating at frequent intervals up to seven or eight years of age. The knowledge obtained through this research is of incalculable value to the men engaging in the practice of otolaryngology, pediatrics, orthodontia, as well as general medicine.

Other papers of great value, dealing with education, legislation, research, and efficiency in orthodontic practice, will be presented to the great benefit of all.

Then there are the Round Table Discussions, the clinics, and the case reports. These should afford a liberal education in orthodontia.

After the installation of the new officers, an inaugural address will be given by President Oren A. Oliver. It has occurred to me that the president's address coming at the end of his administration is his "Swan Song," so it seemed best that the new president should give a short address, outlining his hopes, aspirations and plans for the ensuing year. After he has served one year as president-elect he is familiar with Society affairs, and Oren has served the Society through the Board of Censors and on committees for years, so he is in a position to outline the new work to be accomplished during his administration.

After consultation with our Executive Committee and other members, it has seemed wise to formulate a plan whereby the requirements for admission into our Society may be raised, also the creation of an American Society of Orthodontists Study Class is being considered.

Our Education Committee through its capable and energetic chairman, Oren A. Oliver, is working on the above problems and at our business session will present plans for consideration.

I shall endeavor to have a copy of my address containing recommendations in your hands by July first, so as to enable you first to study and then to discuss concisely the respective problems in which you are most interested.

The Estes Park Meeting

ORTHODONTISTS, ORTHODONTIC DENTISTS AND DENTISTS:

Make arrangements at once to participate pleasantly and profitably in the coming meeting of the American Society of Orthodontists, July 15 to 20, at Estes Park.

Look over the outline of the splendid program published in this issue and the May issue of this Journal and read carefully the discussion of it by President Ketcham. I think that you will agree that some of the most vitally interesting topics of orthodontics at the present time are the features of an outstanding program which will be presented by some of the foremost and most capable men in their respective fields. Surely you will gain much in the form of actual knowledge as well as an inspiration from these noted speakers and clinicians. The Round Table Discussions have worthily become an important factor in our meetings. Here we have informal, friendly discussions and arguments, the result of which is of genuine value to all of us. The clinics will be especially good this year and are particularly well related to the lecture sessions. Frequently a single clinic will be of sufficient interest to a member that he will feel well repaid for his attendance.

The Local Arrangements Committee has planned something different in the form of recreation for us every afternoon. Arrange to be in Estes Park for dinner Monday, July 15, and then hear the splendid lecture by our good friend Joe Mills on "Wild Life in the High Country." Stay until Saturday and take the wonderful drive up to Fall River Pass which the Rocky Mountain Society of Orthodontists have arranged.

After such a thoroughly good meeting in such delightful surroundings, you should return to your offices better qualified to cope with the many problems in orthodontia. Don't miss this opportunity. Bring your families. Personally, I am looking forward to a wonderful meeting and a mighty good time.

CHARLES R. BAKER,
Secretary-Treasurer.

Fishing in Colorado

Come try the fly fishing—a sport to please kings! There is nothing like that tingling thrill when a large rainbow trout strikes your fly just as it buzzes down and lights on the water in some secluded beaver pond. Your line whizzes out as Mister Trout takes the fly down deep in the pool, then breaks the water on the unexpected side. Oh! how he glistens in the sun! Finally he is in your landing net, and then safely lodged in your creel. After one such experience you are a lifetime member of that great band of sportsmen wearing an old hat, hip boots, and a broad smile, carrying a rod, reel, and creel, thereby qualifying as a true follower of Isaac Walton.

There are miles of wonderful trout streams and tributaries of the Big Thompson, and many glistening pools made by nature's most diligent and scientific engineer—the little beaver. A good angler, using a certain amount of skill, can always catch a mess of trout.

There is a private lake called Mary's Lake, which is a beautiful body of water in a peaceful valley, about two miles from the Stanley Hotel. There the less experienced fisherman can rent a boat with the guarantee that he will catch a fish. This lake, being privately controlled, is well stocked with an abundant supply of brook and rainbow trout, so there is a small charge per pound for the fish you catch.



Mary's Lake, Estes Park, Colo.

Ladies may fish free, but a license is required for men and for boys over sixteen years of age, which permits them to fish anywhere in Colorado. The license fee is \$3. There are many lakes and streams within a day's drive of the Park, and private parties may be made up, procuring the services of a licensed guide, to go by pack train to almost inaccessible lakes high in the mountains where few white men have gone to fish. There are good snappy saddle horses for rent in the Park.

Tackle may be rented in the Park. Bait and a good assortment of flies may be procured. A five-ounce rod and a light line are all that is necessary. The flies to be used depend on the time of day and the insect life at the time you are fishing.

TO THE MEMBERS OF THE AMERICAN SOCIETY OF ORTHODONTISTS:

You have all heard the story of the two Irishmen, so we will pass right along and tell you something better. A program surpassing all expectations has been secured; and amid surroundings such as we have never had before, you are assured of both profit and pleasure all at the same time at the price of one admission.

If there is anything lacking in the list of clinics, you have ample time to prepare one and bring it along. And if you feel like discussing any issue, just put down that basket of rainbow trout and bull-heads and start something, for the only wasted part on the program

is the time it takes you to pull off a three pounder or hunt for that old repaint. Drive out if possible—you will find the roads O. K. and considerably safer than eight-way traffic at home.

Everybody will be there. Californians are attending so as to get away from their unusual climate. The Texans will be there trying to locate those Northerners that Colorado sends down to them each winter. Chicago will send a "full" quota if they get by the firing line. The South, yes sub, will be out to make comparison of you-all's hospitality, and the New Yorkers will make the pilgrimage into the provinces, just to joke good old Pike's Peak about its skyline.

The Colorado boys have promised everything in reason except cashing checks, and above all we will all be with the best bunch of good fellows you will ever find, and that reminds me about a certain clinic (received too late for publication), "Hypochondriac Anomalies of Angler's for Top-Waters, with Reference to the Findings of Falta, Watson, Haig and Haig." But I'll wait and let Clint and Carl tell you about it.

P. G. SPENCER.

Estes Park Is Awaiting You

By W. E. Flesher, Oklahoma City, Oklahoma, Chairman Board of Censors

First, you will want to see Denver, the Mile High City.

To investigate her many points of interest will be worth while.

Incidentally, the golf courses are all you would desire.

Come two or more days early and enjoy these surroundings.

Then you will enjoy the delightful trip to Estes Park.

The drive is interesting: the roaring mountain streams, precipitous canyons, rugged and snow-capped mountains.

The approach to Estes Park is most beautiful.

The mountain atmosphere will be exhilarating.

Joe Mills in his "Wild Life in the High Country," Monday evening, will prepare you to enjoy your stay in Estes Park.

The Local Arrangements Committee has done everything possible to make the Estes Park Meeting profitable and enjoyable.

The Rocky Mountain Society of Orthodontists knows how to function and to accomplish results.

The program has been well planned. We expect it to hold your attention.

It will not tire you. It will be profitable.

Each session has a definite message to present.

The papers will not be too long.

The discussions will be crisp and to the point.

By a friendly arrangement different viewpoints will be heard.

The program for each session is closely fitted to the time assigned.

Of necessity the program must be operated on schedule.

You may depend on President Ketcham at the chair.

Busses will provide transportation from the outlying hotels to the headquarters.

They will have you there *on time* for the opening of the sessions.

The afternoon sessions will be adjourned early.

All will enjoy the time arranged for relaxation.

You may have the remainder of the day with your family, or you may play golf, you may fish, you may do as you wish—the time is yours.

Then you will sleep and oh, how you will want to eat!

Special arrangements have been made for entertaining the ladies and children.

On Saturday the trip to Fall River Pass will be the closing and culminating entertainment feature.

Here is your chance to see the "Top of the World," to snowball your friends, to see the effects of snowslides, to see the world above the timber line. The lariat trails will interest and thrill you.

The officers and committees will have everything in readiness.

Every angle *except one* has been provided for.

This *one* is beyond our control.

You only can provide this.

It is *your* contribution to the Meeting. *It is you.*

With *you* present, the success of the Meeting is assured.

The challenge is to *you.*

American Society of Orthodontists

The annual meeting of the American Society of Orthodontists will be held in Estes Park, Colorado, from Monday evening, July 15, until Saturday afternoon, July 20, 1929. Hotels: Stanley (headquarters), The Craggs, Lewiston, Elkhorn, and Estes Park Chalets. Members of the American Dental Association and also of the American Medical Association are invited to attend. A registration fee of \$10.00 will be charged to non-members.

Albert H. Ketcham, President

Charles R. Baker, Secretary

636 Church Street

Evanston, Illinois